ORDER NO. KM49810317C3

Service Manual

DYNAMIC SOUND FOCUS PLUS

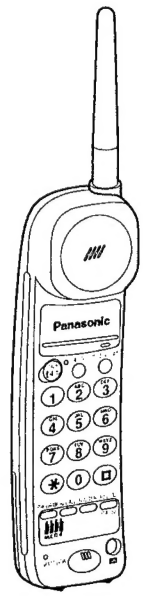
Telephone Equipment

KX-TC187AL-W

Cordless Phone

White Version

(for Australia)



(HANDSET)

(BASE UNIT)

■ SPECIFICATIONS

General

Modulation:	FM, 5 kHz Deviation
Frequency Stability:	±2.5 kHz
Dial Type:	Tone (DTMF)
Redial:	Last dialed number each time the Redial button is pressed
Pause:	3.5 seconds per pause
Memory Capacity:	10 telephone numbers, up to 16 digits per station

	Base Unit	Handset
Power Source:	AC adaptor KX-A11BAXAL (DC 12 V)	Built-in rechargeable Ni-Cd battery (PQXA36ASVC)
(Receiver Section)		
Receiving Frequency:	10 channels within 39.775 to 40.000 MHz	10 channels within 30.075 to 30.300 MHz
Adjacent Channel Rejection:	40 dB	40 dB
Sensitivity:	1dB μV for 20 dB S/N	2 dB μV for 20 dB S/N
(Transmitter Section)		
Transmitting Frequency:	10 channels within 30.075 to 30.300 MHz	10 channels within 39.775 to 40.000 MHz
Jacks:	DC IN, Telephone line	
Antenna:	Telescopic	Rubber Flexible
Speaker:	$2\frac{1}{2}$" (6.5 cm) PM dynamic	$1\frac{3}{16}$" (3 cm) dynamic
Microphone:	Condenser microphone	Condenser microphone
Dimensions (H×W×D):	$2\frac{11}{32}$"×$6\frac{3}{8}$"×9" (60×162×229 mm)	$11\frac{7}{8}$"×$2\frac{3}{16}$"×$1\frac{23}{32}$" (302×56×44 mm)
Weight:	1.26 lbs. (570 g)	0.51 lbs. (230g) with battery

Design and specifications are subject to change without notice.

Panasonic

KX-TC187AL-W

⚠ WARNING

This service information is designed for experienced repair technicians only and is not designed for use by the general public.
It does not contain warnings or cautions to advise non-technical individuals of potential dangers in attempting to service a product.
Products powered by electricity should be serviced or repaired only by experienced professional technicians.
Any attempt to service or repair the product or products dealt with in this service information by anyone else could result in serious injury or death.

When you mention the serial number, write down all 11 digits. The serial number may be found on the label affixed to the bottom of the unit.

FOR SERVICE TECHNICIANS

ICs and LSIs are vulnerable to static electricity.
When repairing, the following precautions will help prevent recurring malfunctions.
1. Cover plastic parts boxes with aluminum foil.
2. Ground the soldering irons.
3. Use a conductive mat on worktable.
4. Do not grasp IC or LSI pins with bare fingers.

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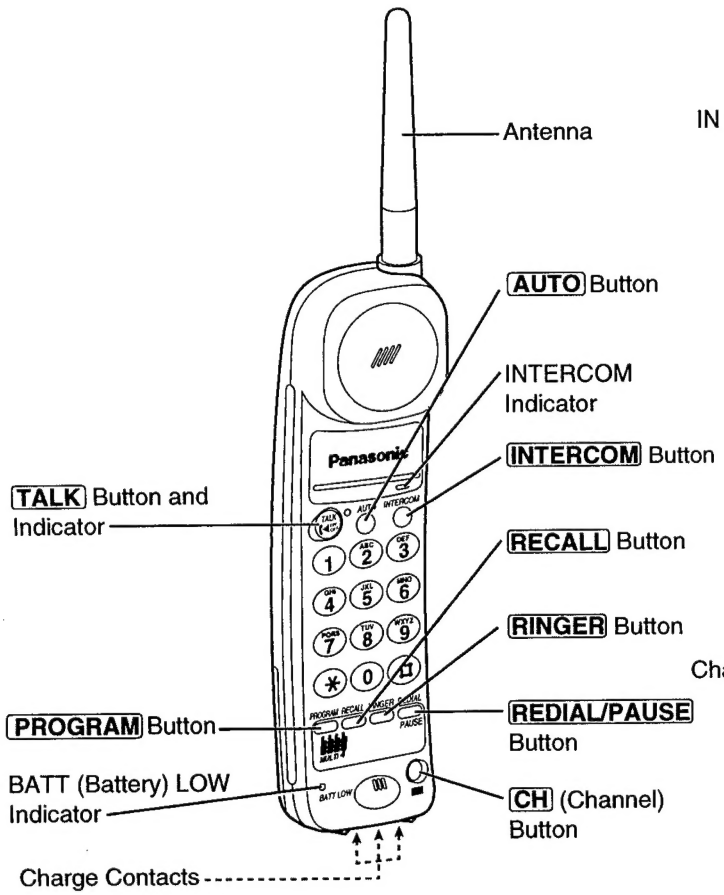
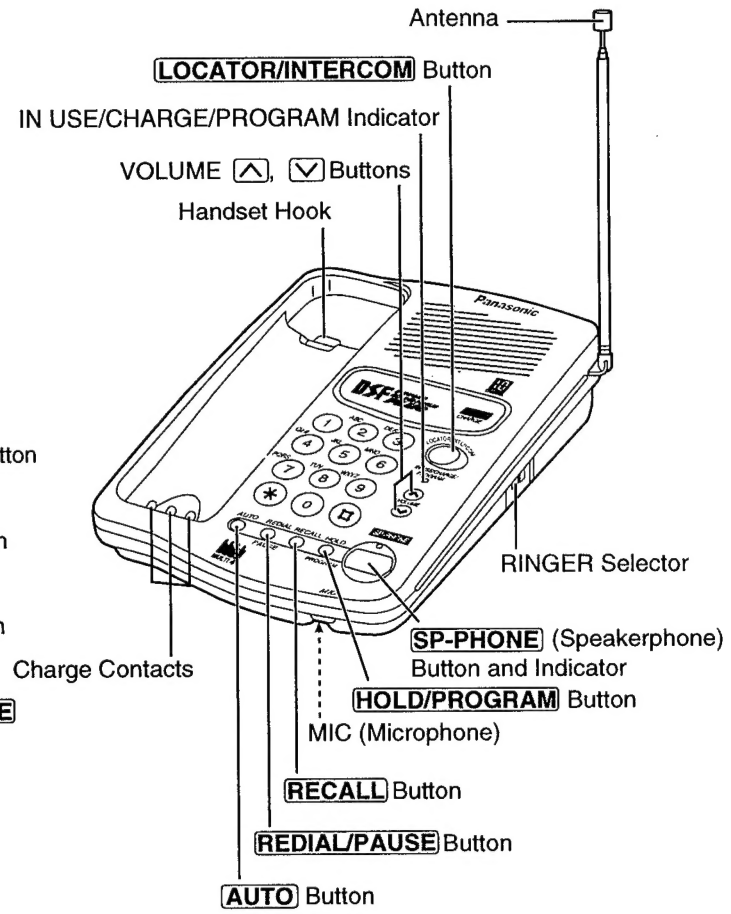
LOCATION OF CONTROLS

Handset



Base Unit



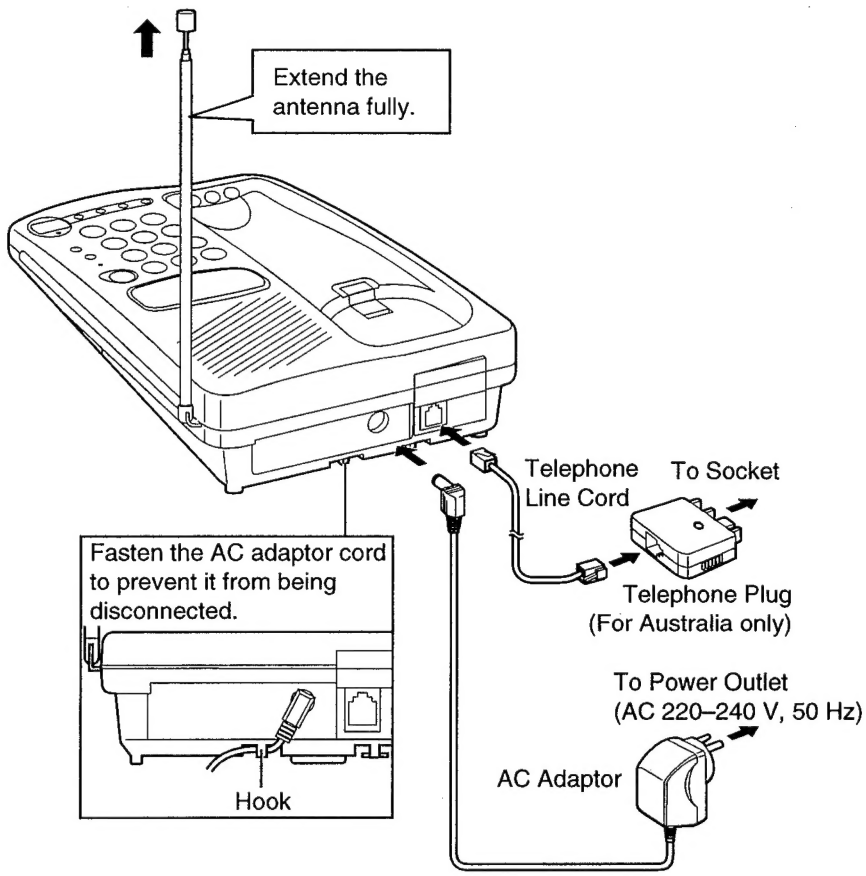
STANDARD BATTERY LIFE

If your Panasonic battery is fully charged;

While in use (TALK)	Up to about 8 hours
While not in use (Stand-by)	Up to about 20 days

- Battery life may vary depending on usage conditions and ambient temperature.
- **Clean the handset and the base unit charge contacts with a soft dry cloth once a month. Clean more often if the unit is subject to grease, dust or high humidity.** If not, the battery may not charge properly.
- If the battery is fully charged, you do not have to place the handset on the base unit until the BATT LOW indicator flashes. This will maximize the battery life.
- The battery cannot be overcharged.

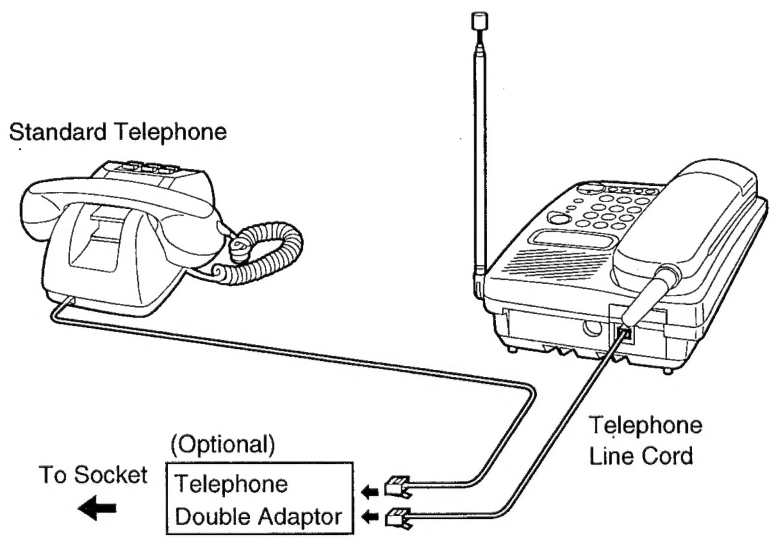
CONNECTION



- USE ONLY Panasonic AC ADAPTOR KX-A11BAXAL.
- The AC adaptor must remain connected at all times.
  (It is normal for the adaptor to feel warm during use.)
- KX-TC187AL-W is not designed to be used with rotary (pulse dialling) services.

Adding Another Phone

This unit will not function during a power failure. To connect a standard telephone on the same line, use a telephone double adaptor.



OPERATIONS

Making Calls with the Handset

1 Press [TALK].
The TALK indicator lights.

2 Dial a telephone number.

3 To hang up,
press [TALK] or place the handset on the base unit.
• The indicator light goes out.

• If an alarm tone sounds in step 1, move closer to the base unit or place the handset on the base unit. Then try again.

To redial the last number dialled on the handset

Press [TALK] ➡ [REDIAL/PAUSE].

If noise interferes with the conversation

Press [CH] to select a clearer channel or move closer to the base unit.

Back-lit

The handset dialling buttons will light while dialling and flash when a call is received. The light will go out about 10 seconds after dialling or answering a call.

Luminous Talk Key

The [TALK] button uses non-radioactive luminescent material which can absorb light energy of sunlight or lamps (incandescent, fluorescent, halogen, etc.) and release this absorbed light for darkened room operation.
• As the absorbed energy in the [TALK] button material decreases, the button brightness will fade naturally.
• Button brightness and duration depends on the amount of room lighting and exposure time.

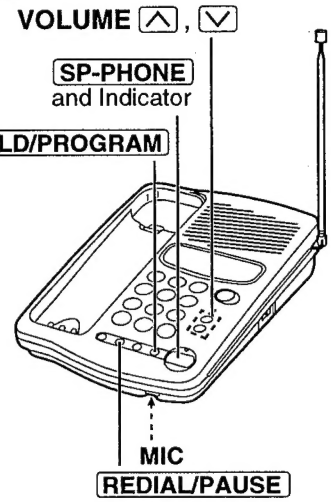
Making Calls with the Base Unit

1 Press [SP-PHONE].
The SP-PHONE indicator lights.

2 Dial a telephone number.

3 When the other party answers, talk into the **MIC** (microphone).

4 To hang up, press [SP-PHONE].
•The indicator light goes out.



To adjust the speaker volume (12 levels) while talking

To increase, press **VOLUME** ∧. To decrease, press **VOLUME** ∨.

During the speakerphone operation:
• For best speakerphone performance, use in a quiet room and talk alternately with the caller.
• If the other party has difficulty hearing you, press **VOLUME** ∨ to decrease the speaker volume. Reducing the speakerphone volume will increase the microphone sensitivity.
• While using the speakerphone, if the handset is on the base unit, you may switch to it by lifting it up.

To redial the last number dialled on the base unit

Press [SP-PHONE] ➡ [REDIAL/PAUSE].

To put a call on hold

Press [HOLD/PROGRAM].

• The SP-PHONE indicator flashes.
• After 6 minutes, warning tones will sound every 10-15 seconds. After a total of 10 minutes, the call will be disconnected.

To release the hold

From the base unit, press [SP-PHONE].

From the handset, press [TALK] or lift the handset off the base unit.
• If another phone is connected on the same line, you can also release the hold by lifting its handset.

Simultaneous Keypad Dialling

You can use the base unit like a standard telephone. After pressing [TALK] to make a call with the handset near the base unit, you can also dial using the base unit keypad.

1 Handset:
Press [TALK] .

2 Base unit:
Dial a telephone number while hearing a dial tone with the handset.
- When the other party answers, talk using the handset.

3 Handset:
To hang up, press [TALK] or place the handset on the base unit.

Simultaneous Keypad Dialling is available only after pressing [TALK] .

Useful information

You can enter numbers using the base unit keypad for example, to access an answering service, electronic banking service, etc.

1. Handset:
   Press [TALK] .
2. Handset:
   Dial a telephone number.
   You may also dial with the base unit keypad.
3. Base Unit:
   Enter the required numbers while listening to the pre-recorded instructions.
4. Handset:
   To hang up, press [TALK] or place the handset on the base unit.

Answering Calls With the Handset

If the handset is off the base unit, press [TALK] .

- You can also answer a call by pressing any dialing button [0] to [9] , [*] , or [#] **(-Any key Talk).**

OR

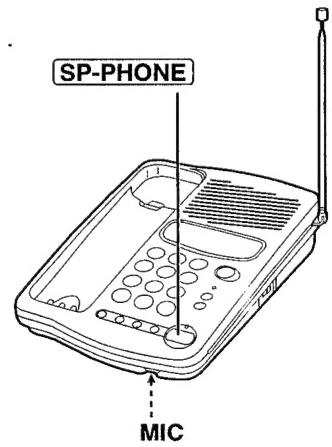
If on the base unit, just lift up.

With the Base Unit

1 Press [SP-PHONE] .

2 Talk into the **MIC**.

3 To hang up, press [SP-PHONE] .



DISASSEMBLY INSTRUCTIONS

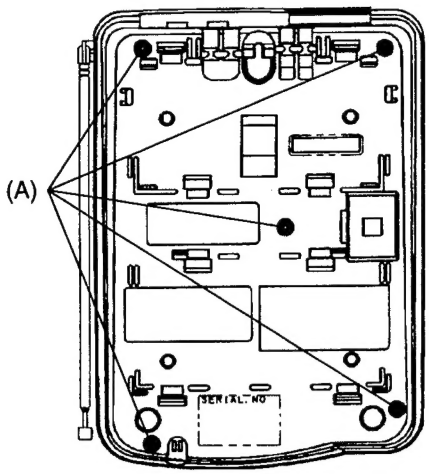


Fig. 1

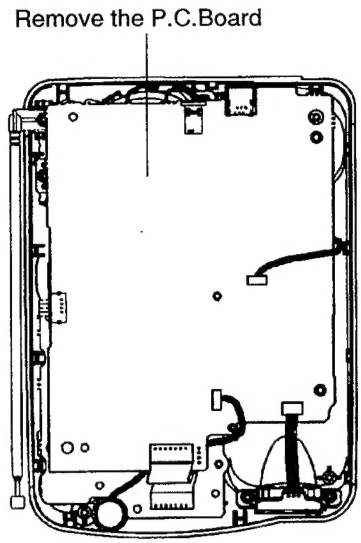


Fig. 2

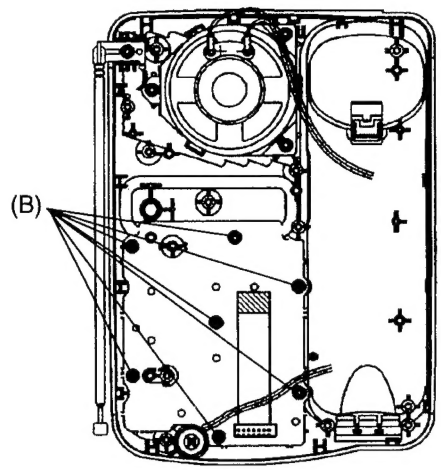


Fig. 3

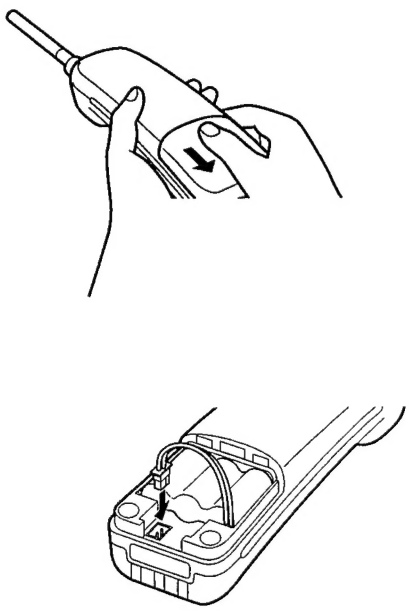


Fig. 4

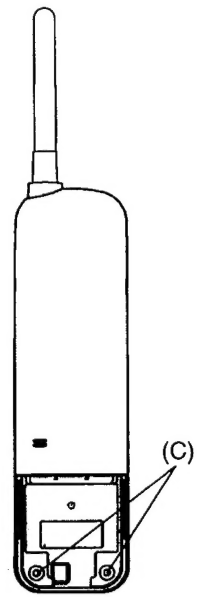


Fig. 5

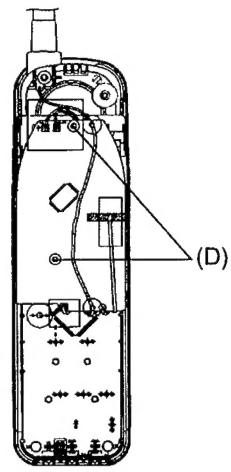


Fig. 6

Ref. No.	Procedure	Shown in Fig.—	To remove—.	Remove—.
1	1	1	Lower Cabinet	Screws (3×14) ..... (A)×5
2	1, 2	2	Main Printed Circuit Board	Remove the P.C.Board
3	1, 2, 3	3	Operation Printed Circuit Board	Screws (3×10) ..... (B)×7
4	4, 5	4	Rear Cabinet	Remove the battery compartment cover
5		5		Screw (2.6×12) ..... (C)×2
6	4~6	6	Printed Circuit Board	Screw (2.6×10) ..... (D)×2

KX-TC187AL-W

HOW TO REPLACE FLAT PACKAGE IC

■ PREPARATION

· SOLDER - - - - - - - Sparkle Solder 115A-1, 115B-1
OR
Almit Solder KR-19, KR-19RMA

· Soldering iron - - - - - Recommended power consumption will be between 30 W to 40 W.
Temperature of Copper Rod 662 ± 50 °F (350 ±10℃)

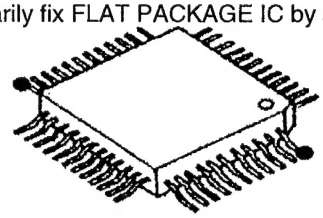
(An expert may handle 60~80 W iron, but beginner might damage foil by overheating.)

· Flux - - - - - - - - - - HI115 Specific gravity 0.863

(Original flux should be replaced daily.)

■ PROCEDURE

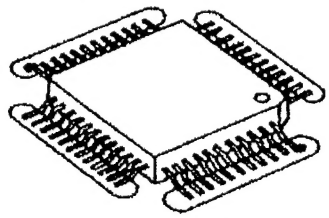
1. Temporarily fix FLAT PACKAGE IC by soldering on two marked pins.

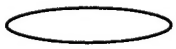


●- - - - - -Temporary soldering point.

*Accurate setting of IC to the corresponding soldering foil is vital.

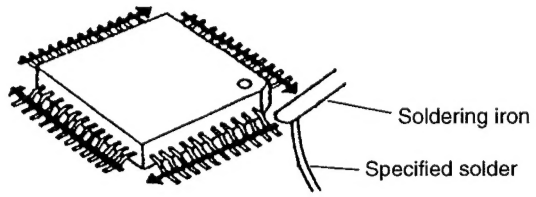
2. Apply flux to all pins of FLAT PACKAGE IC.





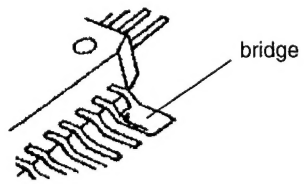
- - - - - Flux

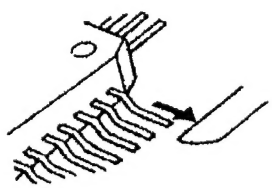
3. Solder using the specified solder by sliding the soldering iron in the direction of the arrow.



■ MODIFICATION PROCEDURE OF BRIDGE

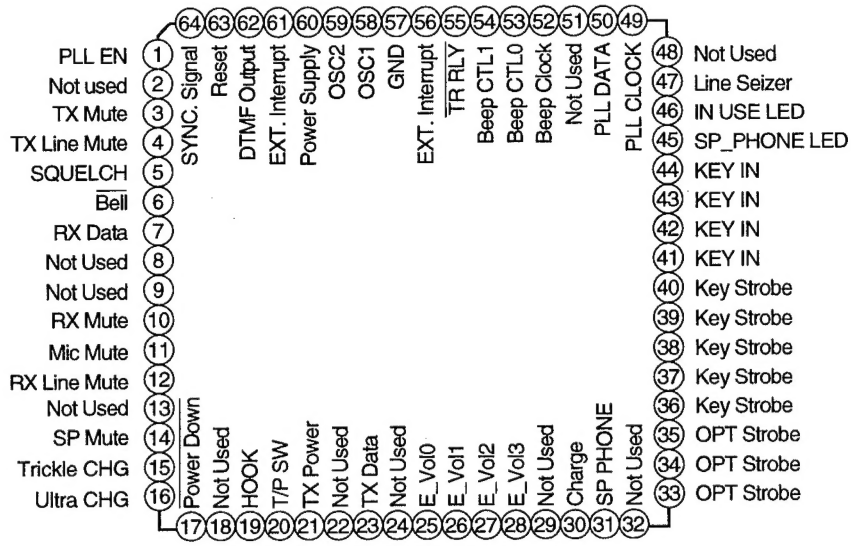
1. Re-solder slightly on bridged portion.
2. Remove any remaining solder along pins using soldering iron as shown below.





CPU DATA (BASE UNIT)

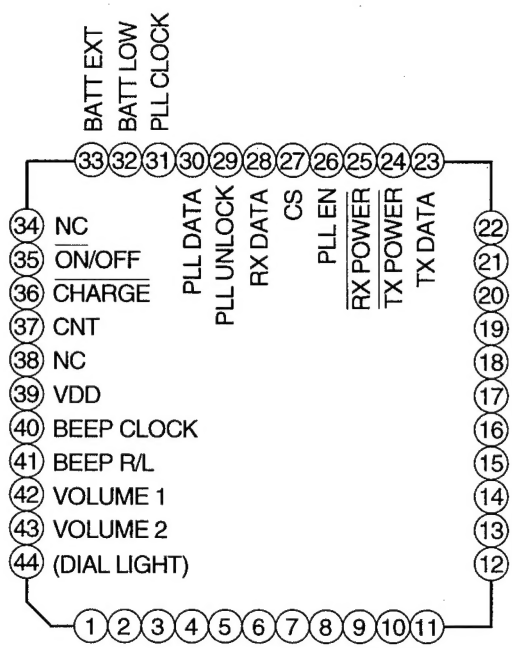
IC501: MN150832KK



Pin No.	Description	I/O	High	High-Z	Low	Pin No.	Description	I/O	High	High-Z	Low
1	PLL EN	O	Active	-	Normal	29	Not Used	I	-	-	Normal
2	Not Used	O	-	-	Normal	30	Charge	I	Normal	-	Charge
3	TX Mute	O	Mute	-	Unmute	31	SP PHONE	O	-	Normal	Active
4	TX Line Mute	O	Mute	-	Unmute	32	Not Used	O	-	-	Normal
5	SQUELCH	I	Weak Electric Field	-	Strong Electric Field	33~35	OPT Strobe	O	-	Normal	Active
6	$\overline{\text{BELL}}$	I	Normal	-	Bell	36~40	Key Strobe	O	-	Active	Normal
7	RX Data	I	Hi	-	Lo	41~44	KEY IN	I	OFF	-	ON
8,9	Not Used	O	-	-	Normal	45	SP_PHONE LED	O	-	OFF	ON
10	RX Mute	O	Mute	-	Unmute	46	IN USE LED	O	-	OFF	ON
11	Mic Mute	O	Mute	-	Unmute	47	Line Seizer	O	-	OFF	ON
12	RX Line Mute	O	Mute	-	Unmute	48	Not Used	O	-	-	Normal
13	Not Used	O	-	-	Normal	49	PLL CLOCK	O	Active	Normal	Active
14	SP Mute	O	Mute	-	Unmute	50	PLL DATA	O	Active	Normal	Active
15	Trickle CHG	O	Ultra: Lo	Normal: Hi	Trickle: Lo	51	Not Used	I	-	-	Normal
16	Ultra CHG	O	Hi	Lo	Lo	52	Beep Clock	O	Active	Normal	Active
17	$\overline{\text{Power Down}}$	I	Normal	-	Power Down	53	Beep CTL0	O	-	Hi:Hi Hi	Hi:Lo Lo	Lo:Reception sound Hi
18	Not Used	O	-	-	Normal	54	Beep CTL1	O	-			
19	HOOK	I	Hook	-	Normal	55	$\overline{\text{TR RLY}}$	O	-	OFF	ON	
20	T/P SW	I	Tone	-	Pulse	56	Ext. Interrupt	I	Normal	-	-	
21	TX Power	O	ON	-	OFF	57	GND		-	-	Normal	
22	Not Used	O	-	-	Normal	58	OSC1	I	Active	-	Active	
23	TX Data	O	Hi	-	Lo	59	OSC2	O	Active	-	Active	
24	Not Used	O	-	-	Normal	60	Power Supply		Normal	-	-	
25	E_Vol0	O	-	Lo: Min ~ Hi: Max		61	Ext. Interrupt	I	Normal	-	-	
26	E_Vol1	O	-	Hi	Hi	62	DTMF Output	O	Active	Normal	Active	
27	E_Vol2	O	-	Lo	Hi	63	Reset	I	Normal	-	Reset	
28	E_Vol3	O	-	Lo	Hi	64	SYNC. Signal	O	Active	-	Active	

CPU DATA (HANDSET)

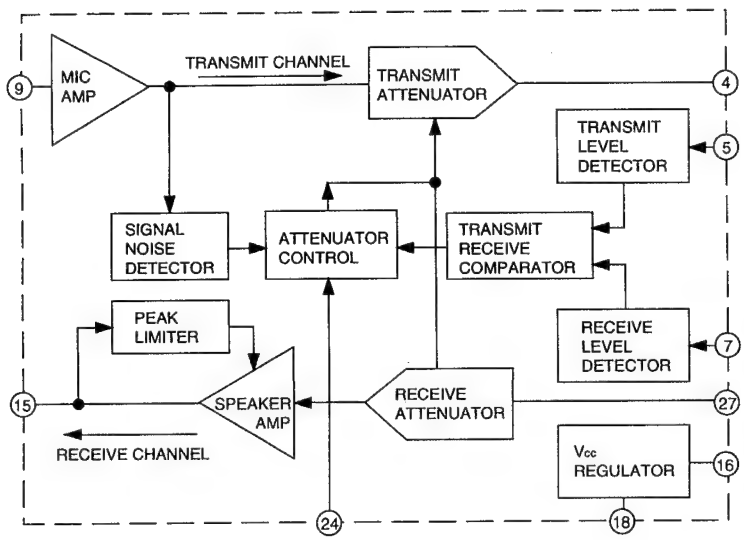
IC202: PQVI0008GE98



Pin No.	Description	I/O	High	High-Z	Low	Pin No.	Description	I/O	High	High-Z	Low
1	Option Strobe 1	O	Normal		Active	25	$\overline{\text{RX Power}}$	O	OFF		ON
2	Option Strobe 0	O	Normal		Active	26	PLL En	O	Latch		Normal
3	Key Strobe 4	O	Normal		Active	27	Squelch	I	Electric Field Low		Electric Field High
4	Key Strobe 3	O		Normal	Active	28	RX Data	I	(Data)		Normal
5	Key Strobe 2	O		Normal	Active	29	PLL Unlock	I	Unlock		Lock
6	Key Strobe 1	O		Normal	Active	30	PLL Data	O	(Data)		Normal
7	Key Strobe 0	O		Normal	Active	31	PLL Clock	O	(Clock)		Normal
8	Key In 3	I	OFF		ON	32	Batt Low	I	High		Low
9	Key In 2	I	OFF		ON	33	Battery	I	High		Low
10	Key In 1	I	OFF		ON	34	Not Used				
11	Key In 0	I	OFF		ON	35	$\overline{\text{ON}}$/OFF	I	OFF		ON
12	Not Used					36	$\overline{\text{Charge}}$ (Battery Terminal)	I	Normal		Charge
13	Not Used					37	$\overline{\text{Charge}}$ (Control)	I	Base Unit		Charger
14	LED (BATT LOW)	O		OFF	ON	38	Internally Conn.				
15	LED (TARK)	O		OFF	ON	39	VDD				
16	LED (INTERCOM)	O		OFF	ON	40	Beep Clock	O	Normal		(Clock)
17	GND					41	Beep Control	O	Low		High
18	Sub Clock	I				42	VOLUME1	O	Lo:High		High:Low
19	(32.768kHz)	I				43	VOLUME2	O	:High		High
20	$\overline{\text{Reset}}$	I	Normal		Reset	44	Dial Light	O	ON		OFF
21	Main Clock	I									
22	(3.99MHz)	I									
23	TX Data	O	(Data)		Noraml						
24	$\overline{\text{TX Power}}$	O	OFF		ON						

EXPLANATION OF IC TERMINALS (BASE UNIT)

IC601: PQVISC77655S

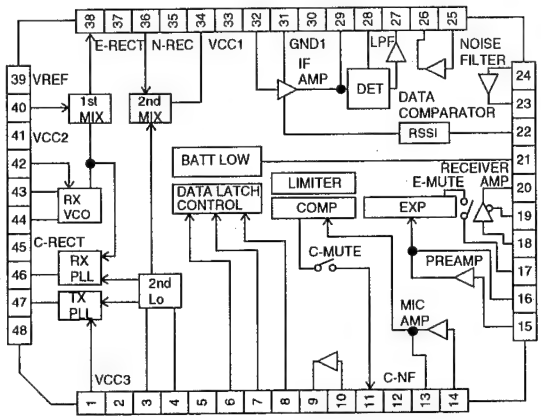


• Pin Description

Pin No.	Name	Description
1	RR	A resistor to ground provides a reference current for the transmit and receive attenuators.
2	RTX	A resistor to ground determines the nominal gain of the transmit attenuator. The transmit channel gain is inversely proportional to the RTX resistance.
3	TXI	Input to the transmit attenuator. Input resistance is nominally 5.0 kohms.
4	TXO	Output of the transmit attenuator. The TXO output signal drives the input of the transmit level detector, as well as the external circuit which drives the telephone line.
5	TLI	Input of the transmit level detector. An external resistor ac coupled to the TLI pin sets the detection level. Decreasing this resistor increases the sensitivity to transmit channel signals.
6	TLO	Output of the transmit level detector. The external resistor and capacitor set the time the comparator will hold the system in the transmit mode after speech ceases.
7	RLI	Input of the receive level detector. An external resistor ac coupled to the RLI pin sets the detection level. Decreasing this resistor increases the sensitivity to receive channel signals.
8	RLO	Output of the receive level detector. The external resistor and capacitor set the time the comparator will hold the system in the receive mode after the receive signal ceases.
9	MCI	Microphone amplifier input. Input impedance is nominally 10 kohms and the dc bias voltage is approximately equal to VB.
10	MCO	Microphone amplifier output. The mic amp gain is internally set at 34 dB (50 V/V).
11	CP1	A parallel resistor and capacitor connected between this pin and Vcc holds a voltage corresponding to the background noise level. The transmit detector compares the CP1 voltage with the speech signal from CP2.
13	CP2	A capacitor at this pin peak detects the speech signals for comparison with the background noise level held at CP1.

Pin No.	Name	Description
13	XDI	Input to the transmit detector system. The microphone amplifier output is ac coupled to the XDI pin through an external resistor.
14	SKG	High current ground pin for the speaker amp output stage. The SKG voltage should be within 10 mV of the ground voltage at Pin ㉒.
15	SKO	Speaker amplifier output. The SKO pin will source and sink up to 100 mA when ac coupled to the speaker. The speaker amp gain is internally set at 34 dB (50 V/V).
16	V+	Input dc supply voltage. V+ can be powered from Tip and Ring if an ac decoupling inductor is used to prevent loading ac line signals. The required V+ voltage is 6.0 to 11V (7.5V nominal) at 7.0 mA.
17	AGC	A capacitor from this pin to VB stabilizes the speaker amp gain control loop, and additionally controls the attack and decay time of this circuit. The gain control loop limits the speaker amp input to prevent clipping at SKO. The internal resistance at the AGC pin is nominally 110 kohms.
18	$\overline{CS}$	Digital chip select input. When at a Logic "0" (<0.7V) the Vcc regulator is enabled. When at a Logic "1" (>1.6V), the chip is in the standby mode drawing 0.5mA. An open $\overline{CS}$ pin is a Logic "0". Input impedance is nominally 140 kohms. The input voltage should not exceed 11 V.
19	SKI	Input to the speaker amplifier. Input impedance is nominally 20 kohms.
20	Vcc	A 5.4 V regulated output which powers all circuits except the speaker amplifier output stage. Vcc can be used to power external circuitry such as a microprocessor (3.0 mA max). A filter capacitor is required. The PQVISC77655 can be powered by a separate regulated supply by connecting V+ and Vcc to a voltage between 4.5 V and 6.5 V while maintaining $\overline{CS}$ at a Logic "1".
21	VB	An output voltage equal to approximately Vcc/2 which serves as an analog ground for the speakerphone system. Up to 1.5 mA of external load current may be sourced from VB. Output impedance is 250 ohms. A filter capacitor is required.
22	Gnd	Ground pin for the IC (except the speaker amplifier).
23	XDC	Transmit detector output. A resistor and capacitor at this pin hold the system in the transmit mode during pauses between words or phrases. When the XDC pin voltage decays to ground, the attenuators switch from the transmit mode to the idle mode. The internal resistor at XDC is nominally 2.6 kohms.
24	VLC	Volume control input. Connecting this pin to the slider of a variable resistor provides receive mode volume control. The VLC pin voltage should be less than or equal to VB.
25	ACF	Attenuator control filter. A capacitor connected to this pin reduces noise transients as the attenuator control switches levels of attenuation.
26	RXO	Output of the receive attenuator. Normally this pin is ac coupled to the input of the speaker amplifier.
27	RXI	Input of the receive attenuator. Input resistance is nominally 5.0 kohms.
28	RRX	A resistor to ground determines the nominal gain of the receive attenuator. The receive channel gain is directly proportional to the RRX resistance.

EXPLANATION OF IC TERMINALS



Base Unit

IC201.: PQVIT31224AH

Handset

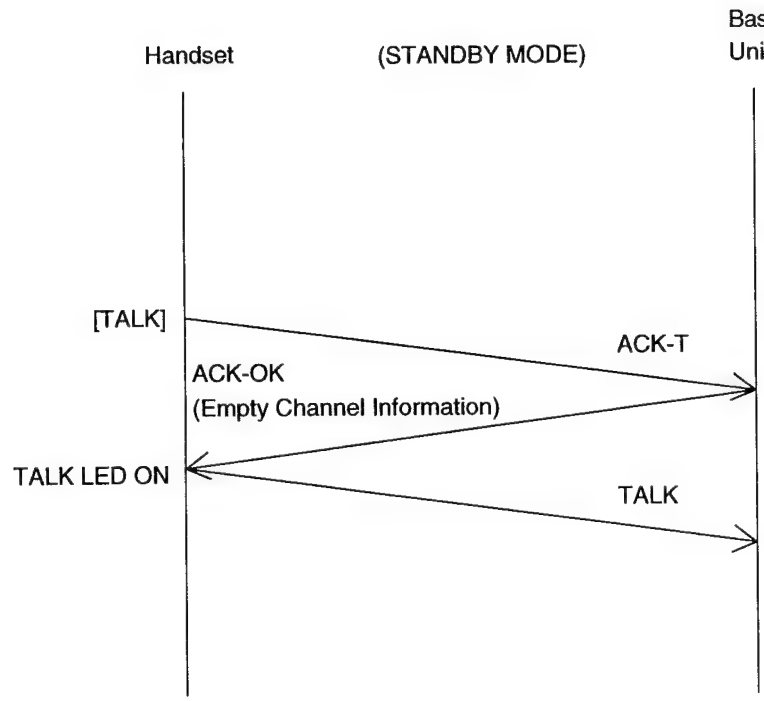
IC1.: PQVIT31224AR

Pin No.	Name	Description	
1	TX-IN	Input terminal of TX-VCO	
2	VCC3	Power supply terminal	
3	LO-1	Local oscillator input output terminal	
4	LO-2	Colpitts oscillating circuit consists of internal emitter follower circuit and external crystal. Additionally external injection through pin (3) is available.	
5	SIG OUT	Detection signal output terminal, which is an open drain.	
6	CLK	Clock input terminal	Input the serial data to control this IC.
7	DATA	Serial data input terminal	
8	STB	Strobe signal input terminal	
9	FIL-OUT	Filter amplifier output terminal	
10	FIL-IN	Filter amplifier input terminal	
11	COMP-OUT	Compressor output	
12	C-NF	SUM amplifier T-shape feed-back circuit consists of external compressor.	
13	MIC-OUT	Mic amplifier output, which is connected to SUM amplifier input directly.	
14	MIC-IN	Mic amplifier input terminal	
15	PRE-IN	Preamplifier inverting input terminal	
16	PRE-OUT	Preamplifier output terminal, which is connected to expander directly.	
17	EXP-OUT	Expander SUM amplifier output terminal, where the signal from gain cell is amplified as inverting amplifier.	
18	RECE-IN	Receiver amplifier inverting input terminal	
19	RO1	Receiving output terminal for dynamic receiver	
20	RO2	Outputs from RO1 and RO2 (BTL type) when ceramic receiver is using.	
21	BAT-ALM	Battery alarm terminal goes high when power supply voltage VCC becomes VBAT-L or less. Data bit controls the detection voltage. This terminal is an open collector output.	
22	RSSI	DC voltage is output according to the input signal level of IF amplifier. The dynamic range is approximately 70dB.	
23	DATA-OUT	Wave arrangement output terminal. This terminal is an open collector output.	
24	D-COMP-IN	Data comparator input terminal to which demodulated signal of data is input.	

Pin No.	Name	Description
25	N FIL-IN	Noise filter input output terminal. BPF consists of external condenser and resistor. This terminal is connected to the rectifier circuit through inside coupling condenser.
26	N FIL-OUT	
27	AF-OUT	Demodulation output signal terminal. Carrier leak is decreased by built-in LPF. Output impedance is approximately 360Ω.
28	QUAD	Phase input terminal of FM demodulator
29	IF-OUT	IF output terminal
30	GND1	GND terminal
31	DEC	2nd IF input terminal and decoupling terminal for bias. Input impedance of Pin 32 is approximately 1.5kΩ.
32	IF-IN	
33	Vcc1	Power supply terminal
34	2nd MIX-OUT	Mixer output terminal. Output impedance is approximately 1.5kΩ.
35	N-REC	The noise filter output is filtered through external capacitor after amplified about 20dB
36	2nd MIX-IN	1st IF input terminal. Input impedance is approximately 4.7kΩ (at 10.695MHz).
37	E-RECT	Connects to the capacitor for rectification in full-wave rectifier circuit of expander.
38	1st MIX-OUT	Mixer output terminal which is connected to the external filter. Output impedance is approximately 330Ω (standard).
39	V REF	Reference voltage of compander which is passed through inside buffer.
40	1st MIX-IN	Mixer input terminal. The mixer is applied the double balanced mixer method.
41	VCC2	Regulator terminal, which outputs 2.0V.
42	VCO-CONT	RX-VCO voltage control terminal
43	VCO-1	RX-VCO resonant terminal
44	VCO-2	
45	C-RECT	Rectifier terminal of compressor. The circuit configuration is the same with E-RECT terminal.
46	RX-OUT	Charge pump output terminal. Constant current output type is adopted and output current can be changed according to the input data.
47	TX-OUT	
48	GND2	GND terminal

EXPLANATION OF CPU DATA COMMUNICATION

1. Calling

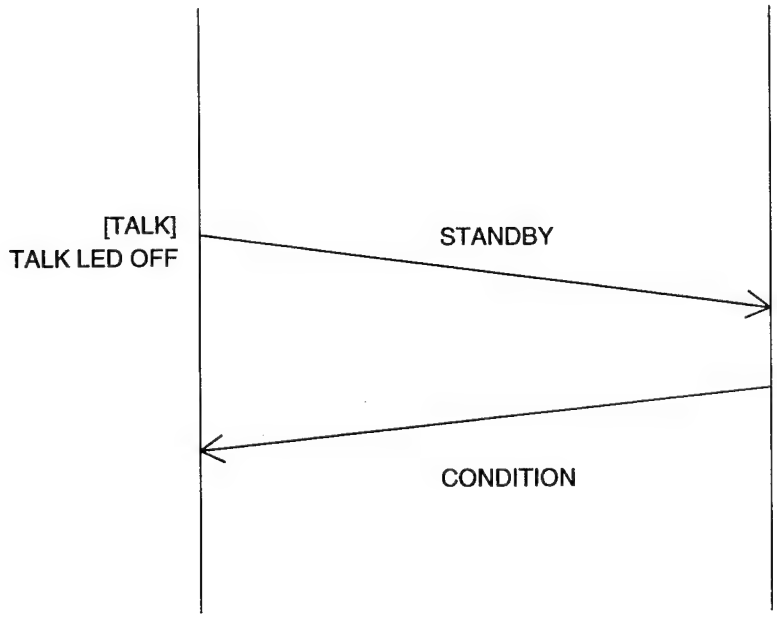


When calling, a communication request DATA (ACK-T) is transmitted from the Handset first, and a permitting data (ACK-OK) is returned from the Base Unit to it, then a communication data (TALK) is transmitted from the Handset.

OFF HOOK
IN USE LED ON

The permitting DATA (ACK-OK) from Base Unit to Handset includes the empty channel information stored in Base Unit. After transmitting the communication DATA (TALK) from Handset to Base Unit, the channel is used.

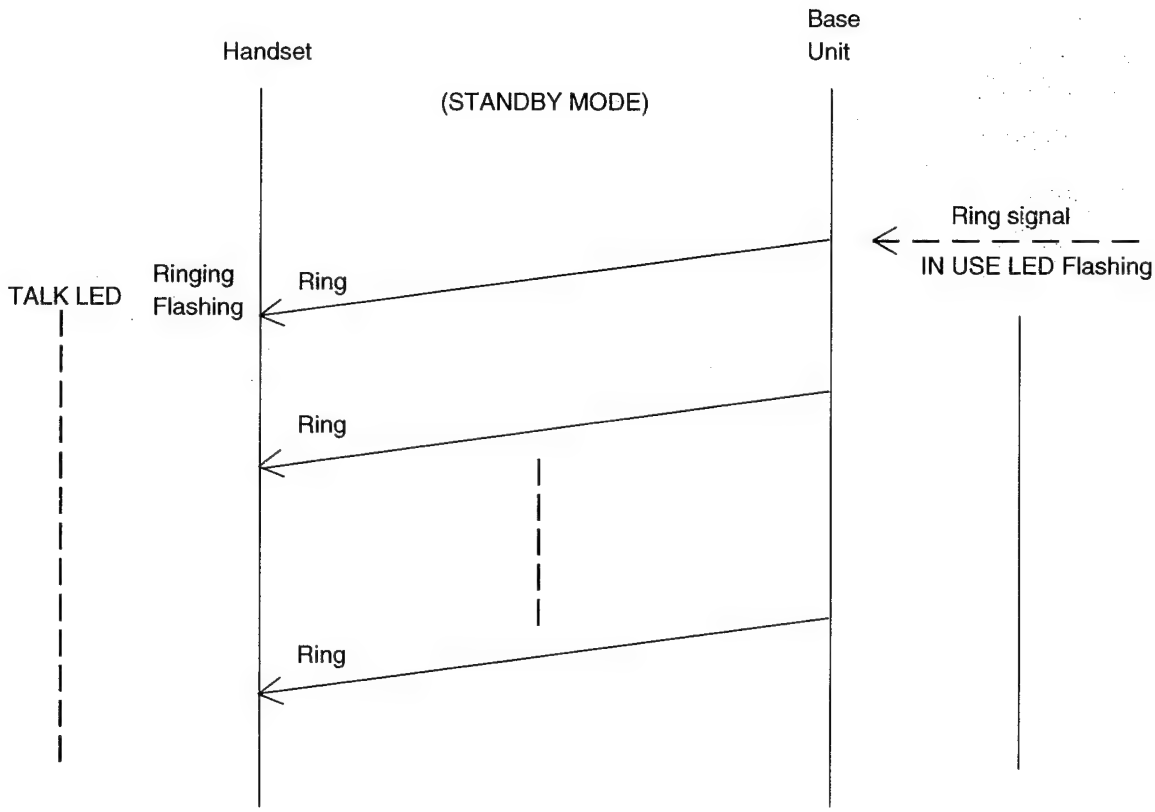
2. To terminate Communication



When the TALK button on Handset is pressedduring communication, a LINK terminating DATA (STANDBY) is sent to terminate communication.
(On the conversation's frequency)

ON HOOK
IN USE LED OFF

3. Ringing



After detecting the Ring signal from circuit, Base Unit sends a ring signal DATA (Ring) on the base's TX frequency, then the Handset starts ringing.

4. Ports for transmitting and receiving of data

Handset :	transmitting ... 23 Pin	receiving ... 28 Pin
Base Unit :	transmitting ... 23 Pin	receiving ... 7 Pin

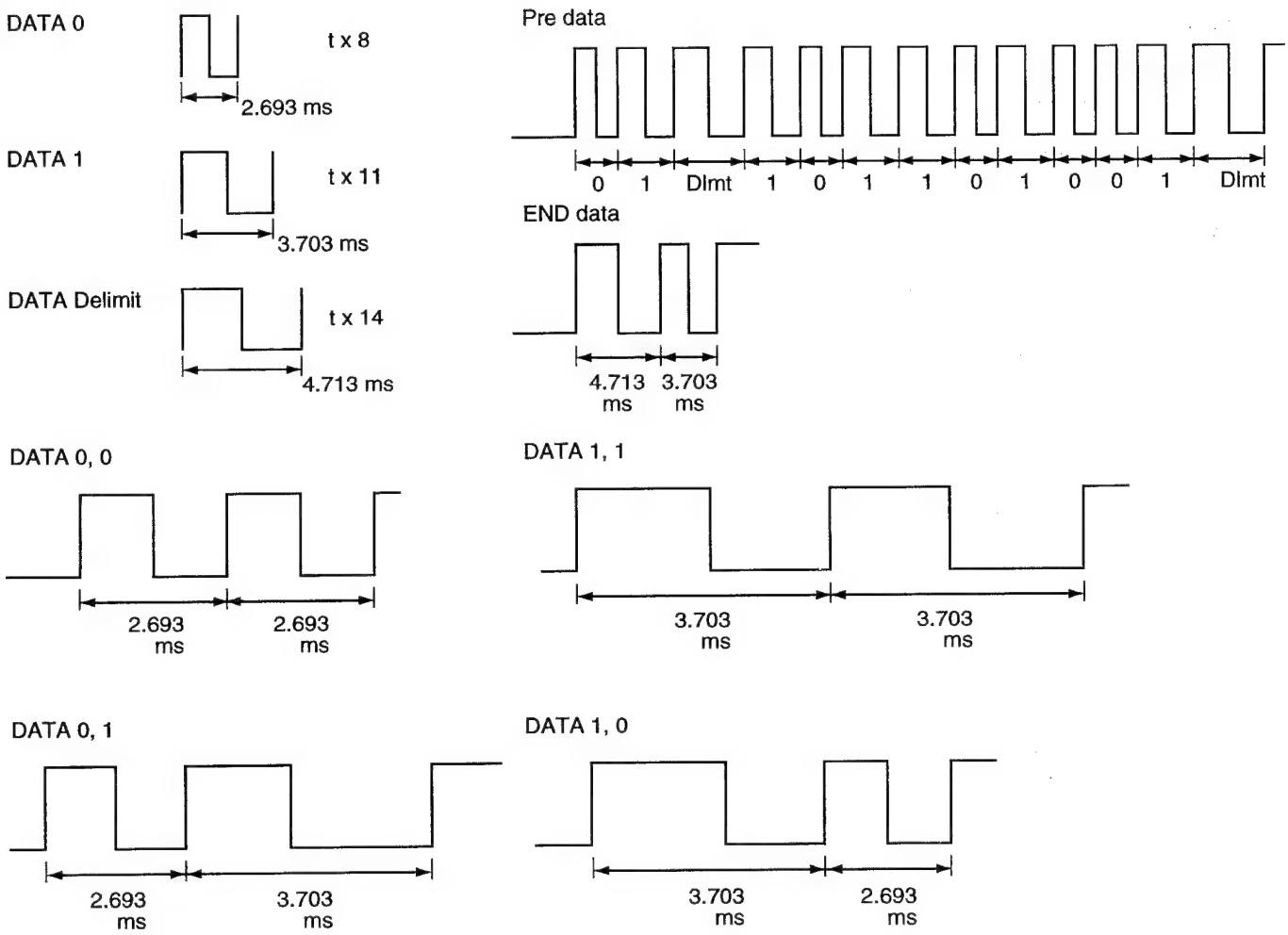
5. Waveform of DATA used for cordless transmission and reception

The DATA which is transmitted from the Handset to the Base Unit is combination of DATA 0, DATA 1, DATA Delimit, Pre data and End data.

The DATA which is transmitted from the Base Unit to the Handset is combination of DATA 0, DATA 1, DATA Delimit, Pre data and End data.

HANDSET

Transmitting DATA Format

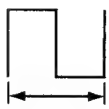


KX-TC187AL-W

BASE UNIT

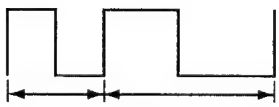
Transmitting DATA Format

DATA 00



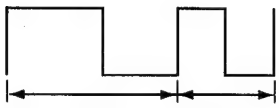
t x 8
2.687 ms

DATA 01



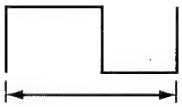
t x 8 t x 11
2.687 ms 3.694 ms

DATA 10



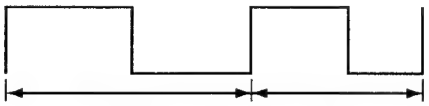
t x 11 t x 8
3.694 ms 2.687 ms

DATA 11



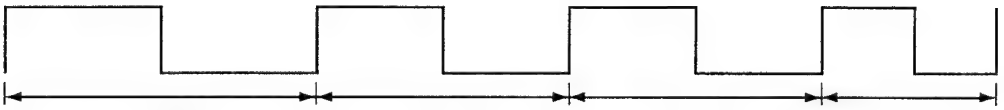
t x 11
3.694 ms

DATA Delimit



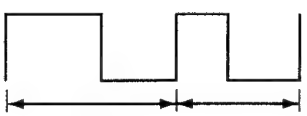
t x 14 t x 11
4.702 ms 3.694 ms

Pre data



t x 20 t x 14 t x 14 t x 11
6.72 ms 4.702 ms 4.702 ms 3.694 ms

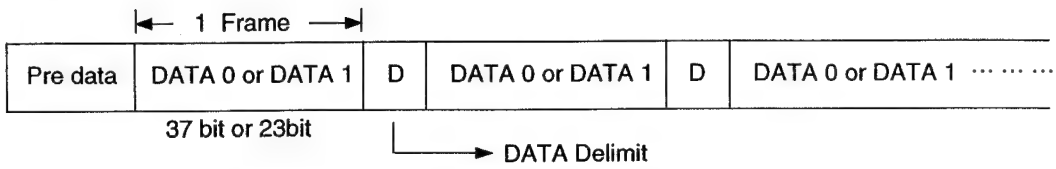
END data



t x 14
4.702 ms 2.015ms

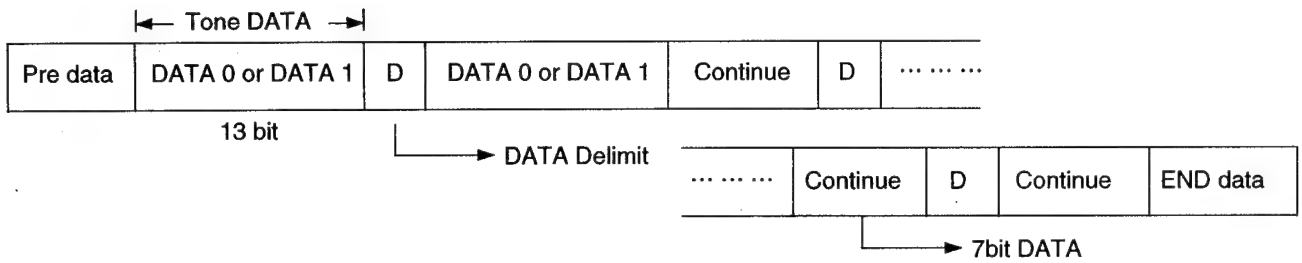
Mute data (9bit)
0, 1, D, 1, 0, 1, 1, 0, 1, 0, 0, 1, D • • • 45 ms

6. When LINKing



When LINKing from the Handset (changing from STBY to TALK), DATA is transmitted in above format. The combined portion of DATA 0 and DATA 1 is transmitted in LINK requesting DATA (37bit) format first.Then,when LINK OK (ACK-OK) DATA (23bit) is returned from the Base Unit, it is sent as LINK form DATA after changing the combination of DATA 0 and DATA 1. And the DATA Delimt is between each Frame as a stop.
The contents of LINK requesting DATA and LINK form DATA are different depending on each operation.

7. Tone Dial



When executing Tone Dial, Tone Dial DATA is transmitted from the Handset to the Base Unit in above format.
The DATA is changed by Dial No. as same as Pulse Dial. When Tone Dialling, DATA (Continue DATA) that the key is pressed continuously is sent to the Base Unit during the key is pressed. When depressing the key, the TONE Dial exterminating DATA (Tone end DATA) is send, and the END data is sent finally.

NOTE

65,000 kinds of the security code are available for the model KX-TC187AL-W. Each time the handset is set on the cradle of the base unit (for charging), the CPU automatically changes the security code.

ADJUSTMENTS (BASE UNIT)

If your unit have below symptoms, adjust each item using remedy column from the table.

Symptom	Remedy
The base unit does not respond to a call from handset.	Make adjustments in item (A)
The base unit does not transmit or the transmit frequency is off.	Make adjustments in item (B)
The transmit frequency is off.	Perform test in item (C)
The transmit power output is low, and the operating distance between base unit and handset is less than normal.	Make adjustments in item (D)
The reception sensitivity of base unit is low with noise.	Make adjustments in item (E)
The transmit level is high or low.	Make adjustments in item (F), (G)
The reception level is high or low.	Make adjustments in item (H)
The unit does not link.	Perform test in item (I)

Unit condition:

Remove the antenna from P.C. Board of the base unit.

Line current 80mA.

How to set the test mode:

1. Set the ringer switch to "HIGH".
2. In pressing S1, set S2 to ON (Power supply is turned ON).
3. The state of the unit changes as following when "VOLUME UP" switch is pressed.

	Test Mode	RX Freq.	TX Freq.	Mode
Power supply is turned ON	Test Mode (1)	CH10	CH10	Talk
Press "VOLUME UP" switch 1 time	Test Mode (2)	CHA	CHA	Talk
Press "VOLUME UP" switch 1 time	Test Mode (3)	CHB	CHB	Talk
Press "VOLUME UP" switch 1 time	Test Mode (4)	CHC	CH1	Talk
Press "VOLUME UP" switch 1 time	Test Mode (5)	CH1	CHB	Intercom
Press "VOLUME UP" switch 1 time	Test Mode (6)	CH1	CHB	Locator

When replacing these parts, adjust as shown in table below table.

Replace Parts	Adjustment items	Test Mode	Adjustment Point	Procedure
IC201, T203	(A) RX VCO Adjustment	Test Mode (1)	T203	1. Set S3 to RX side. 2. Adjust T203 so that the reading of the Digital Voltmeter is 3.5 V±0.1 V.
D301 , T351	(B) TX VCO Adjustment	Test Mode (1)	T301	1. Set S3 to TX side. 2. Adjust T301 so that the reading of the Digital Voltmeter is 1.7 V±0.1 V.
DUP301, X201 T202	(C) TX Frequency Confirmation	Test Mode (3)	———	1. Set S4 to ON. 2. Comfirm so that the reading of the frequency counter is 30.350 kHz±0.5 kHz.
VR302, Q302	(D) TX Power Adjustment	Test Mode (2)	T351	1. Set S5 to ON. 2. Adjust VR302 so that the reading of the RF VTVM is ≧650mV.

When replacing these parts, adjust as shown in table below.

Replace Parts	Adjustment items	Test Mode	Adjustment Point	Procedure
T201	(E) RX Sensitivity Adjustment	Test Mode (2)	T201	1. Set S6, S7 to ON. 2. Apply a 60dB μVemf output from S.S.G. (modulation frequency 1 kHz, dev. 0 kHz). 3. Adjust T201 so that the reading of the RF VTVM is maximum output (10~50 mV).
T202	(F) Line Output Maximum Adjustment	Test Mode (3)	T202	1. Set S6, S8 to ON. 2. Apply a 40dB μVemf output from S.S.G. (modalation frequency 1 kHz. dev. 0 kHz), and adjust T202 so that reading of the AF VTVM is 0.9 V±0.05V.
VR201	(G) Line Output Level Adjustment	Test Mode (3)	VR201	1. Set S6, S8 to ON. 2. Apply a 40dB μVemf output from S.S.G (modalation frequency 1kHz. dev. 3kHz). 3. Adjust VR201 so that the reading of the AF VTVM is 0 dBm±0.5 dBm (600Ω load).
VR301	(I) Line Input Modulation Adjustment	Test Mode (3)	VR301	1. Set S6, S9 and S10 to ON. 2. Input via loop simulator 1.0 kHz, –20.0 dBm/600Ω signal. 3. Apply a 40 dB μVemf output from S.S.G. (modulation frequency 1 kHz, dev. 0 kHz). 4. Adjust VR301 so that the reading of the FM Deviation Meter is 3.0 kHz±0.1 kHz.
IC201	(J) Carrier Sensitivity Comfirmation	Test Mode (4)	——	1. Set S6, S11 to ON. 2. Apply a 35 dB μVemf output from S.S.G. (modulation frequency 1 kHz, dev. 3 kHz). Comfirm so that the oscilloscope becomes Low. 3. Apply a 15 dB μVemf output from S.S.G. (modulation frequency 1 kHz, dev. 3 kHz). Comfirm so that the oscilloscope becomes High.

The connection of adjustment equipments are as shown in page 26.

■ FOR SCHEMATIC DIAGRAM (BASE UNIT) [page 27]

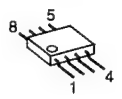
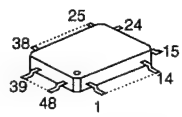
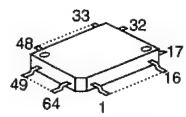
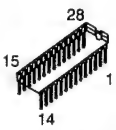
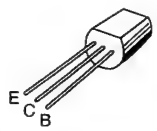
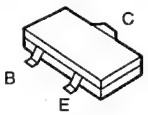
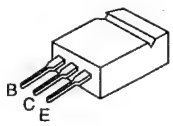
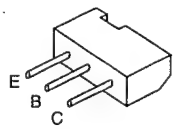
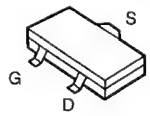
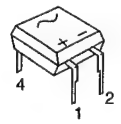
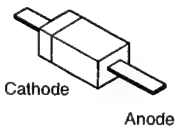
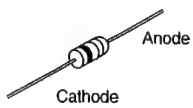
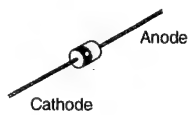
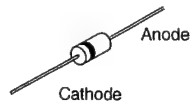
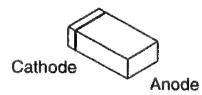
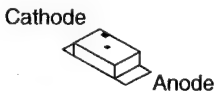
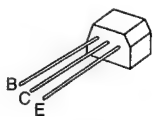
1. S1: Dialling Mode Selector Switch.
2. S2: Ringer Selector Switch.
3. S11: Volume (down) Switch.
4. S12: Volume (Up) Switch.
5. S15: Redial / Pause Switch.
6. S16~24,26,27: Dialling Switch.
7. S25: Tone Switch.
8. S28: Recall Switch.
9. S29: Hold Switch.
10. S30: SP-Phone Switch.
11. S31: Locator / Intercom Switch.
12. DC voltage measurements are taken with electronic voltmeter from negative voltage line.

This schematic diagram may be modified at any time with development of new technology.

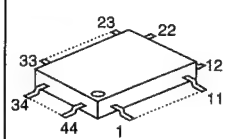
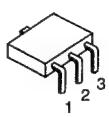
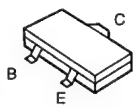
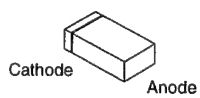
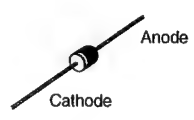
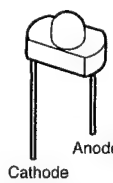
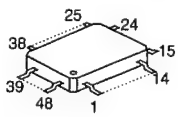
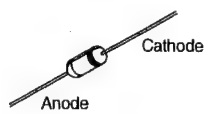
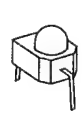
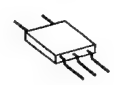
Important Safety Notice:
The shaded area on this schematic diagram incorporates special features important for protection from fire and electrical shock hazards.
When servicing it is essential that only manufacturer's specified parts be used for the critical components in the shaded areas of the schematic.

TERMINAL GUIDE OF IC'S, TRANSISTORS AND DIODES

(BASE UNIT)

 AN6183SAE1	 PQVIT31224AH	 MN150832KK	 PQVISC77655S	 2SA1625 PQVTKSD261CY
 PQVTMSC2295C 2SC2412K 2SD1819A 2SB709A, 2SB1218A PQVTFB1A4M	 2SD2137	 2SD1994A 2SD1991A	 2SK543	 PQVDS1ZB40F1
 PQVDKV1832C3	 MA4100, MA4062 MA4047 ,MA4150 MA4043	 1SS119 MA161	 MA700A MA4330M	 MA110
 PQVDPY1112H PQVDBR1112H	 2SC1740S			

(HANDSET)

 PQVI0008GE98	 PQVIS80730AL PQVIXCC3501P	 PQVT143XK146 PQVTD123T146 2SD601R,2SB709A, PQVTMSC2295C	 MA110 MA728	 PQVDS5688G
 LNJ301MPUJA	 PQVIT31224AR	 MA840BTAKU MA840ATAKU	 PQVDSLN210VC	 XN1116

■ For SCHEMATIC DIAGRAM (HANDSET) [Page 31]

1. SW1~10, 12: Dialling Switch
2. SW11: Tone Switch
3. SW13: Program Switch
4. SW14: Recall Switch
5. SW15: Auto Switch
6. SW16: Redial Switch
7. SW17: Channel Switch
8. SW18: Intercom Switch
9. SW19: Talk Switch
10. SW20: Ringer Switch
11. SW21: Pause Switch
12. DC voltage measurements are taken with electronic voltmeter from negative voltage line. (Talk Posittion)

This schematic diagram may be modified at any time with the development of new technology.

FREQUENCY TABLE (MHz)

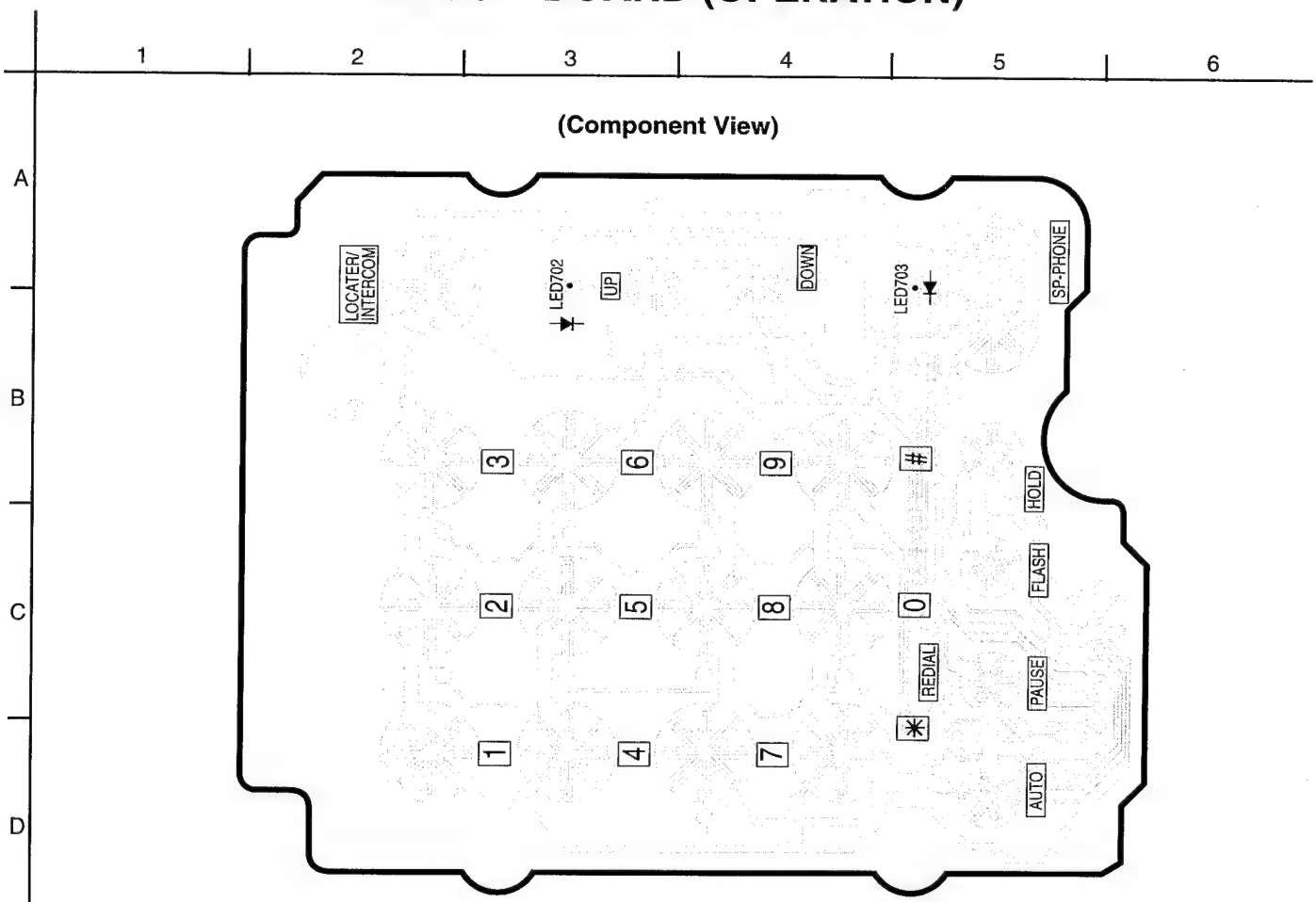
CH	BASE UNIT		HANDSET	
	Transmit Frequency	Receive Frequency	Transmit Frequency	Receive Frequency
1	30.075	39.775	39.775	30.075
2	30.125	39.825	39.825	30.125
3	30.175	39.875	39.875	30.175
4	30.225	39.925	39.925	30.225
5	30.275	39.975	39.975	30.275
6	30.100	39.800	39.800	30.100
7	30.150	39.850	39.850	30.150
8	30.200	39.900	39.900	30.200
9	30.250	39.950	39.950	30.250
10	30.300	40.000	40.000	30.300

TEST MODE

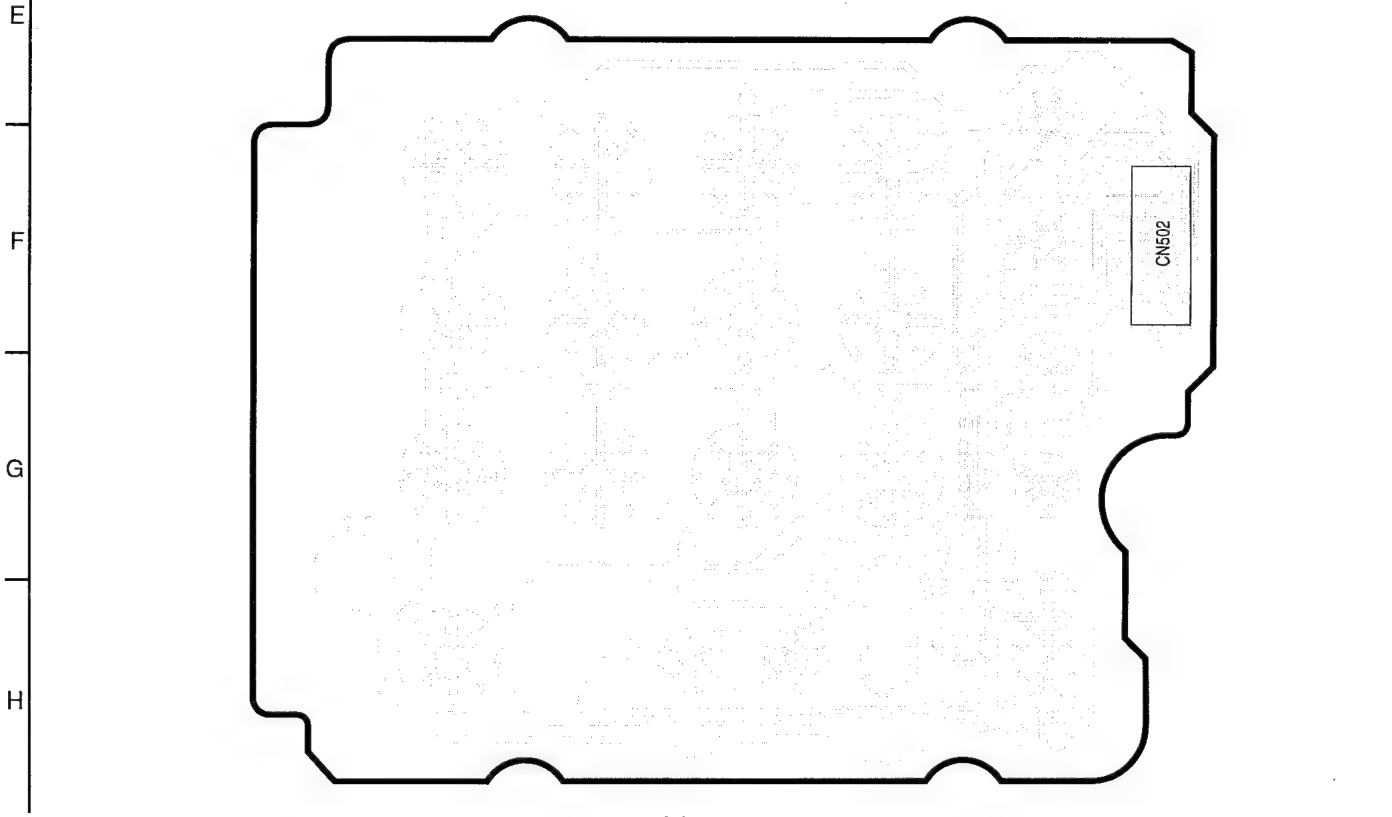
CH	BASE UNIT		HANDSET	
	Transmit Frequency	Receive Frequency	Transmit Frequency	Receive Frequency
A	30.050 MHz	39.7375 MHz	40.050 MHz	30.375 MHz
B	30.350 MHz	40.025 MHz	——	30.020 MHz
C	——	39.7125 MHz	39.700 MHz	30.000 MHz
E	——	——	39.675 MHz	29.975 MHz

CIRCUIT BOARD (OPERATION)

(Component View)



(Flow Solder Side View)

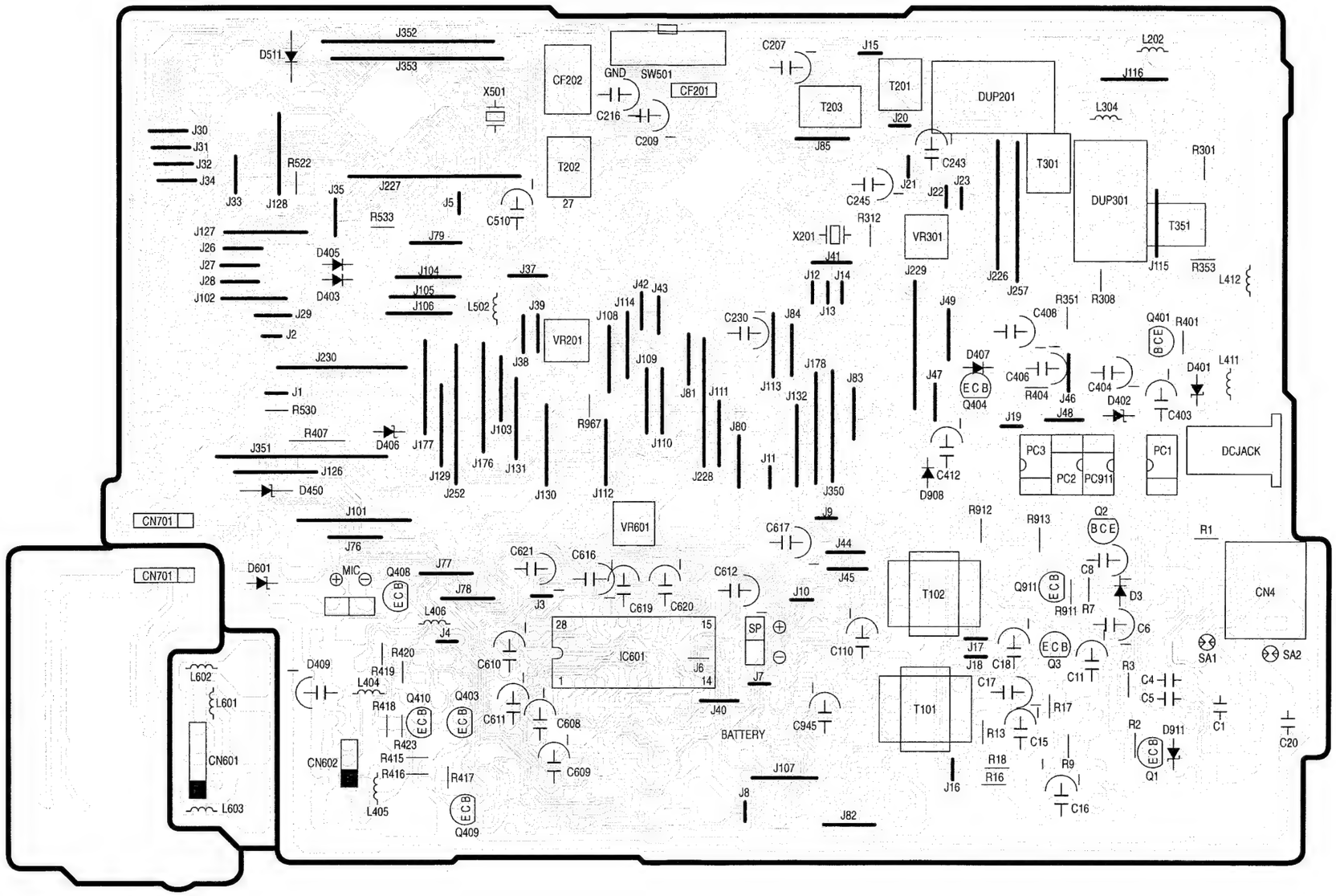


CIRCUIT BOARD AND WIRING CONNECTION DIAGRAM (BASE UNIT)

1 2 3 4 5 6 7 8 9 10 11 12

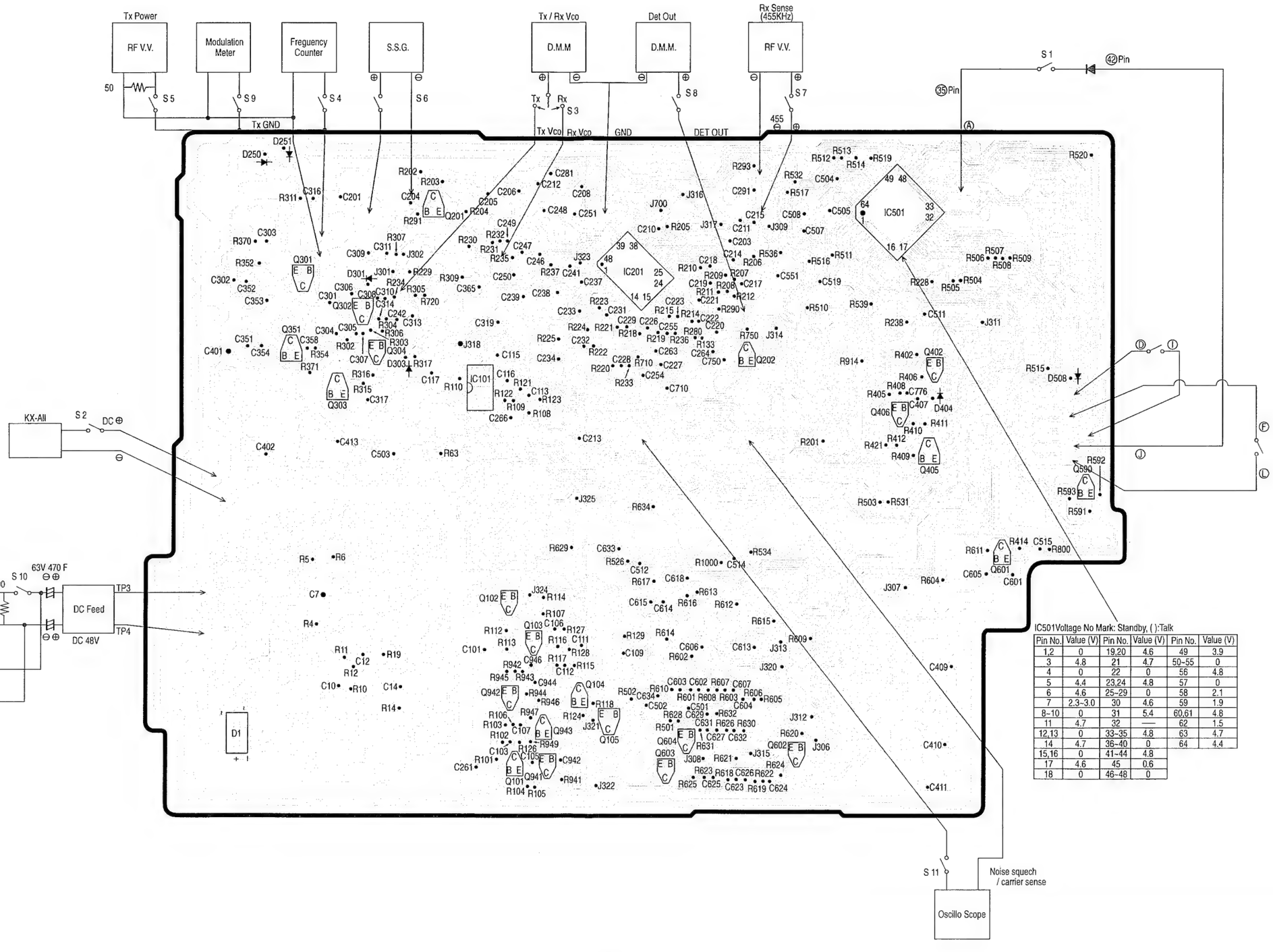
A B C D E F G H

(Component View)



CIRCUIT BOARD AND WIRING CONNECTION DIAGRAM (BASE UNIT)

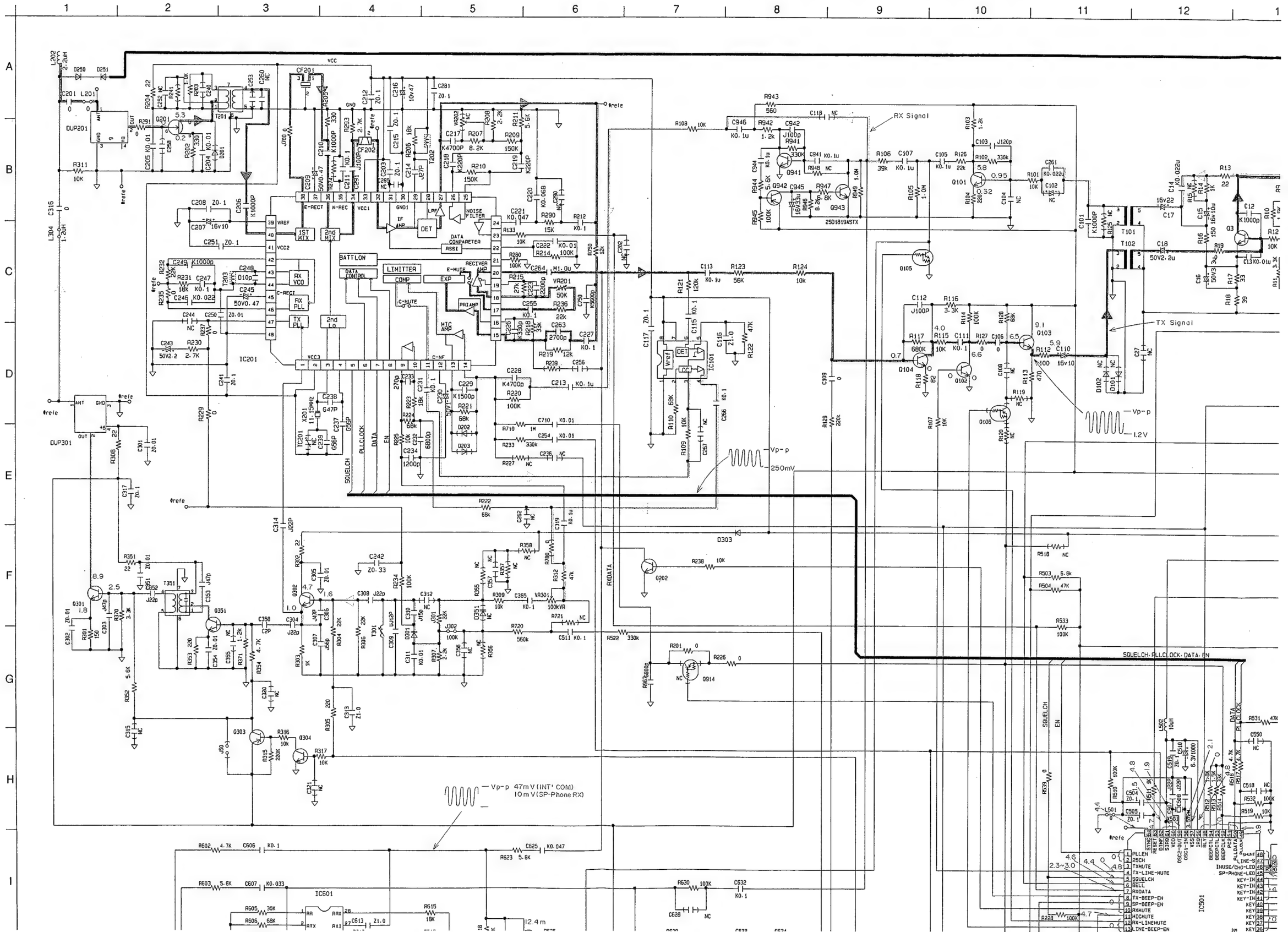
(Flow Solder Side View)



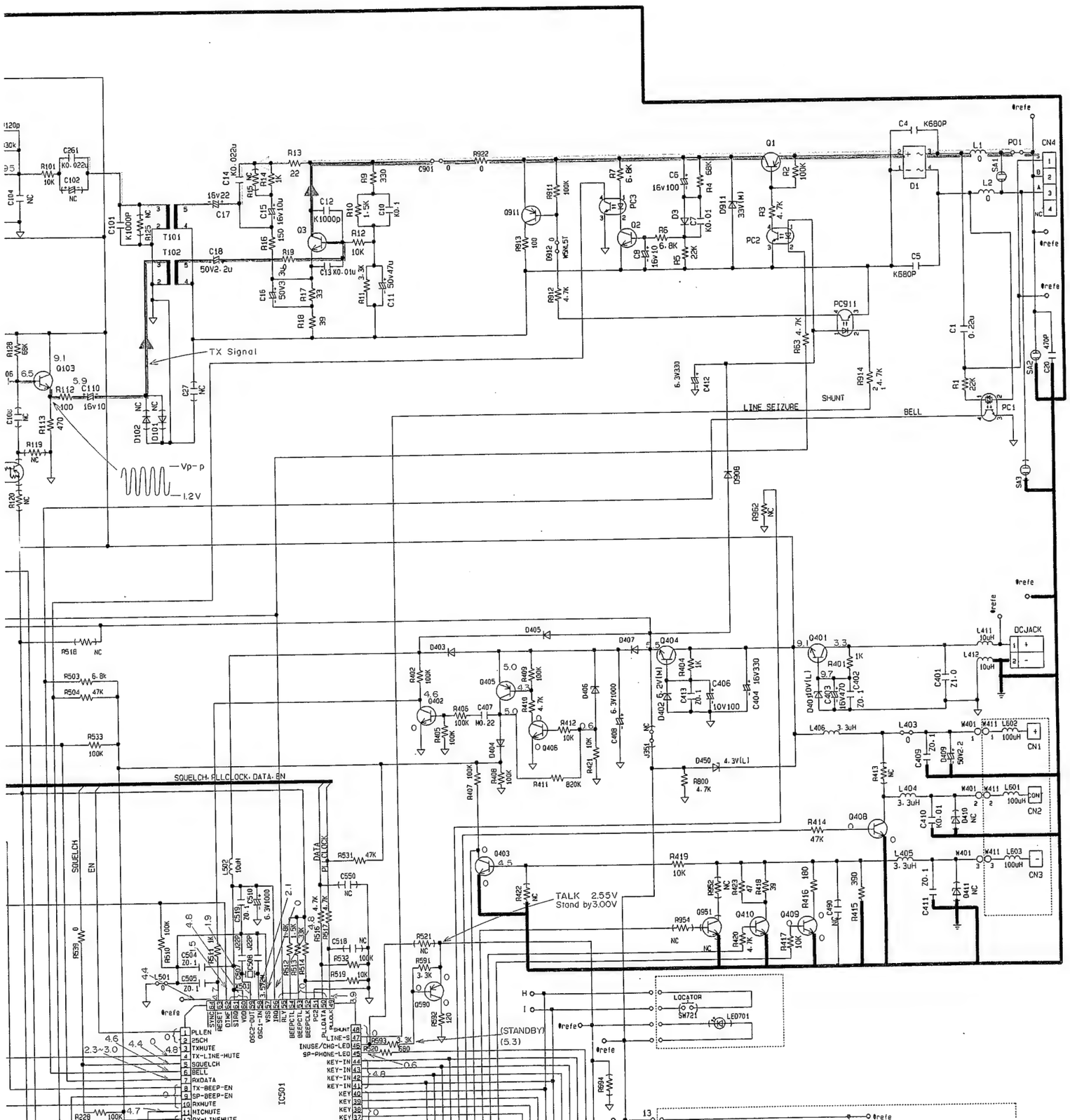
IC501Voltage No Mark: Standby, ( ):Talk

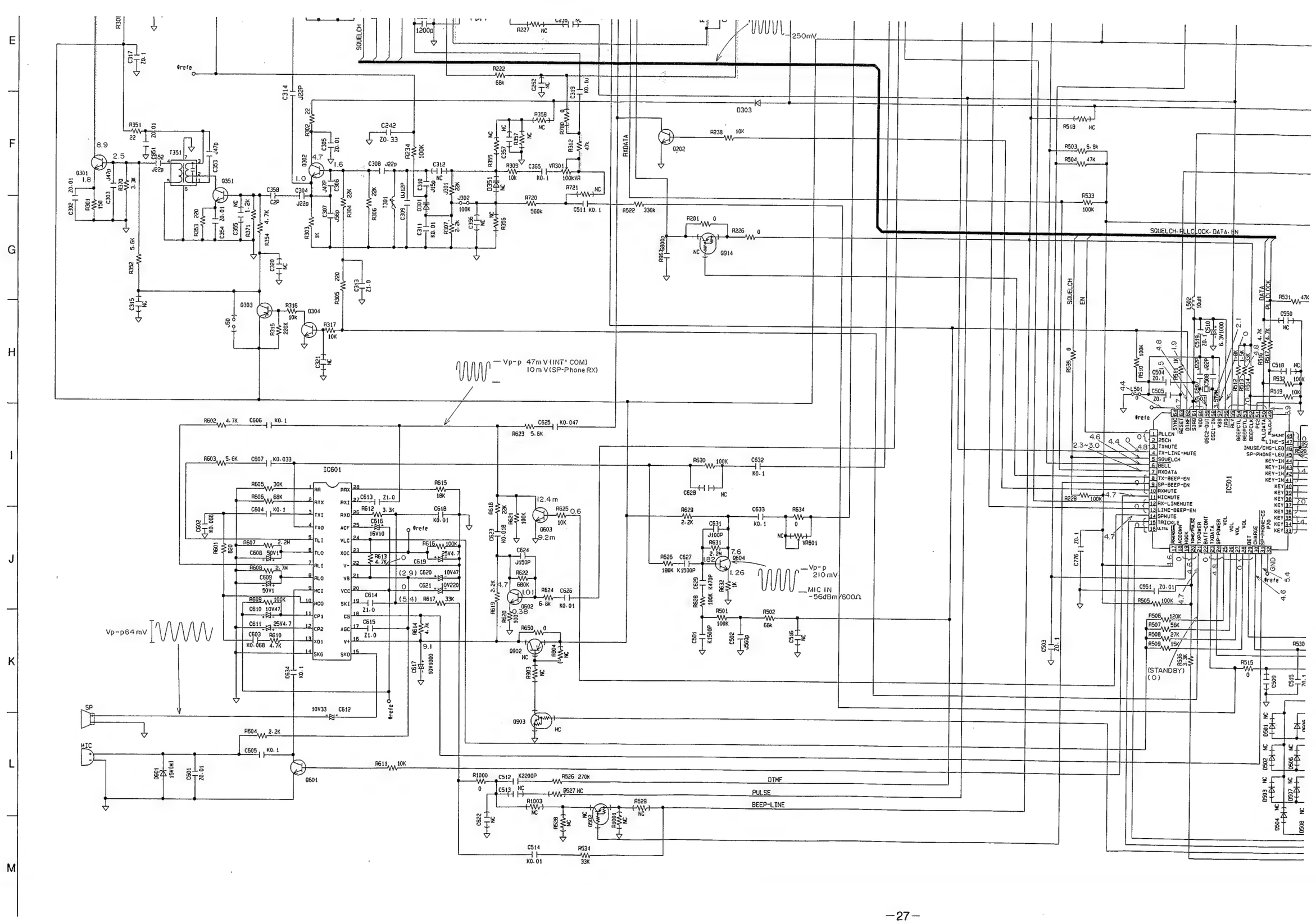
Pin No.	Value (V)	Pin No.	Value (V)	Pin No.	Value (V)
1,2	0	19,20	4.6	49	3.9
3	4.8	21	4.7	50–55	0
4	0	22	0	56	4.8
5	4.4	23,24	4.8	57	0
6	4.6	25–29	0	58	2.1
7	2.3–3.0	30	4.6	59	1.9
8–10	0	31	5.4	60,61	4.8
11	4.7	32	—	62	1.5
12,13	0	33–35	4.8	63	4.7
14	4.7	36–40	0	64	4.4
15,16	0	41–44	4.8		
17	4.6	45	0.6		
18	0	46–48	0		

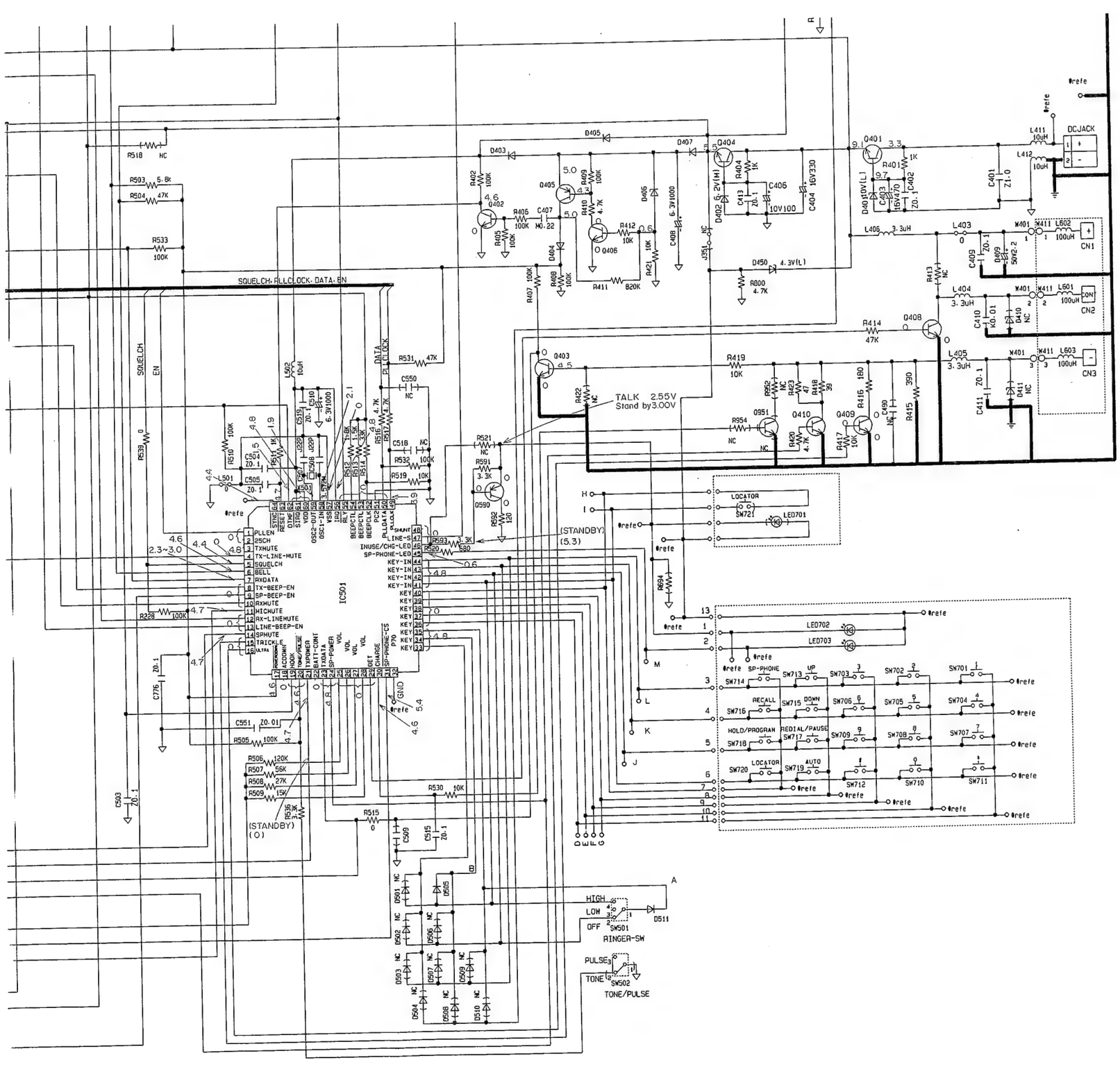
SCHEMATIC DIAGRAM (BASE UNIT)



11 12 13 14 15 16 17 18

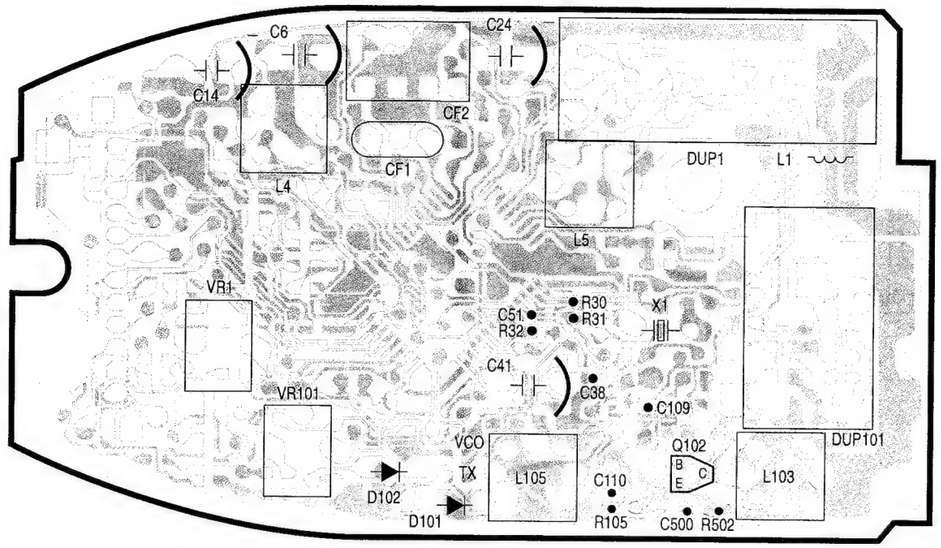


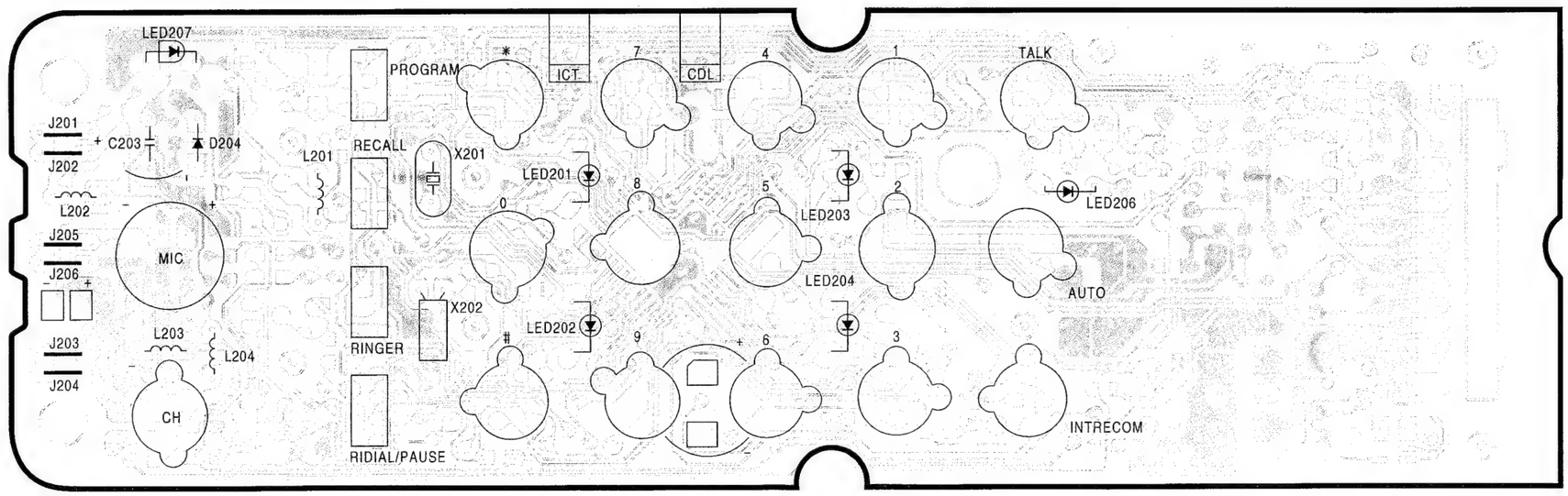

SQUELCH
RXDATA
SQUELCH, PLLCLOCK, DATA, EN
Vp-p 47mV(INT'COM)
10mV(SP-Phone RX)
Vp-p64mV
Vp-p 210mV
MIC IN -56dBm/600Ω
IC601
IC501
Q301
Q303
Q304
Q351
Q202
Q914
Q902
Q903
Q601
Q602
Q603
Q604
T301
T351
SP
MIC
DTMF
PULSE
BEEP-LINE
(STANDBY)
(0)


SQUELCH, PLLCLOCK, DATA, EN
IC501
PLLEN
2SCH
TXMUTE
TX-LINE-MUTE
SQUELCH
BELL
RXDATA
TX-BEEP-EN
SP-BEEP-EN
RXMUTE
MICMUTE
RX-LINEMUTE
LINE-BEEP-EN
SPMUTE
TRICKLE
TALK 2.55V
Stand by3.00V
(STANDBY)
(5.3)
(STANDBY)
(O)
LOCATOR
SW721
LED701
LED702
LED703
SP-PHONE
RECALL
DOWN
UP
HOLD/PROGRAM
REDIAL/PAUSE
LOCATOR
AUTO
SW701
SW702
SW703
SW704
SW705
SW706
SW707
SW708
SW709
SW710
SW711
SW712
SW713
SW714
SW715
SW716
SW717
SW718
SW719
SW720
DCJACK
CN1
CN2
CN3
HIGH
LOW
OFF
SW501
RINGER-SW
PULSE
TONE
SW502
TONE/PULSE

CIRCUIT BOARD AND WIRING CONNECTION DIAGRAM (HANDSET)

(Component View)

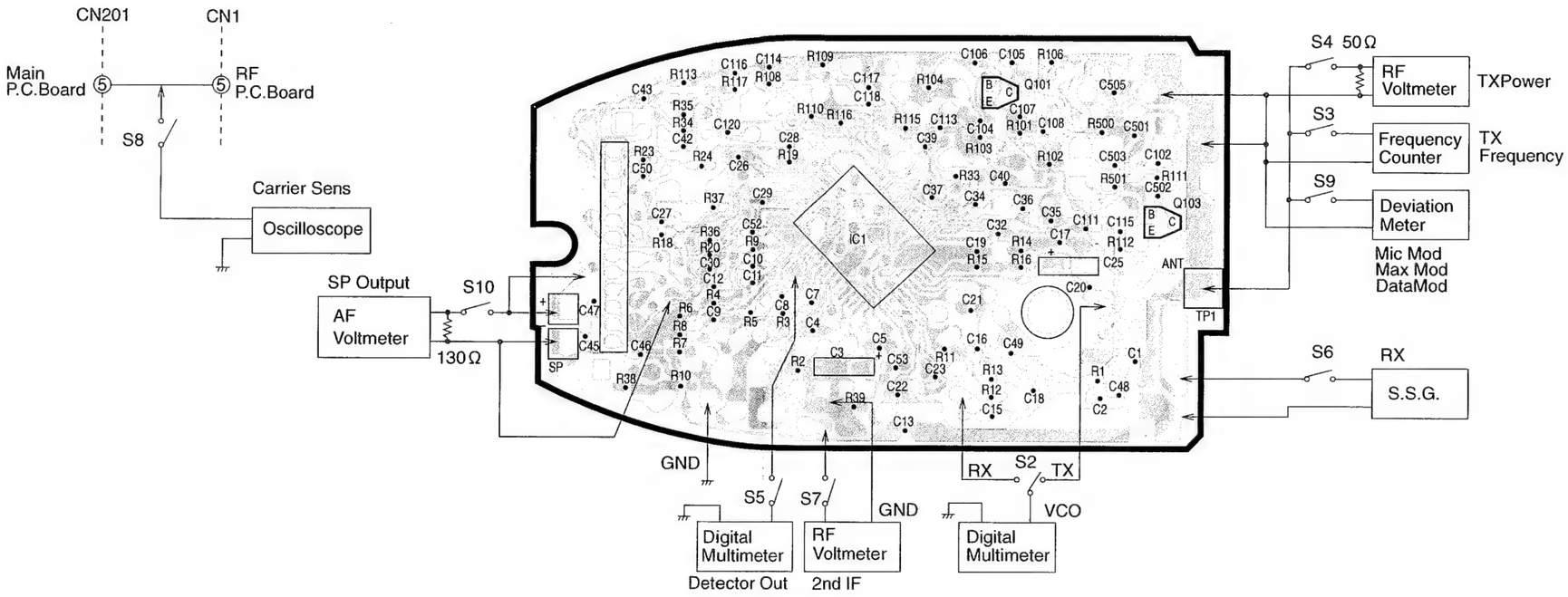




KX-TC187AL-W

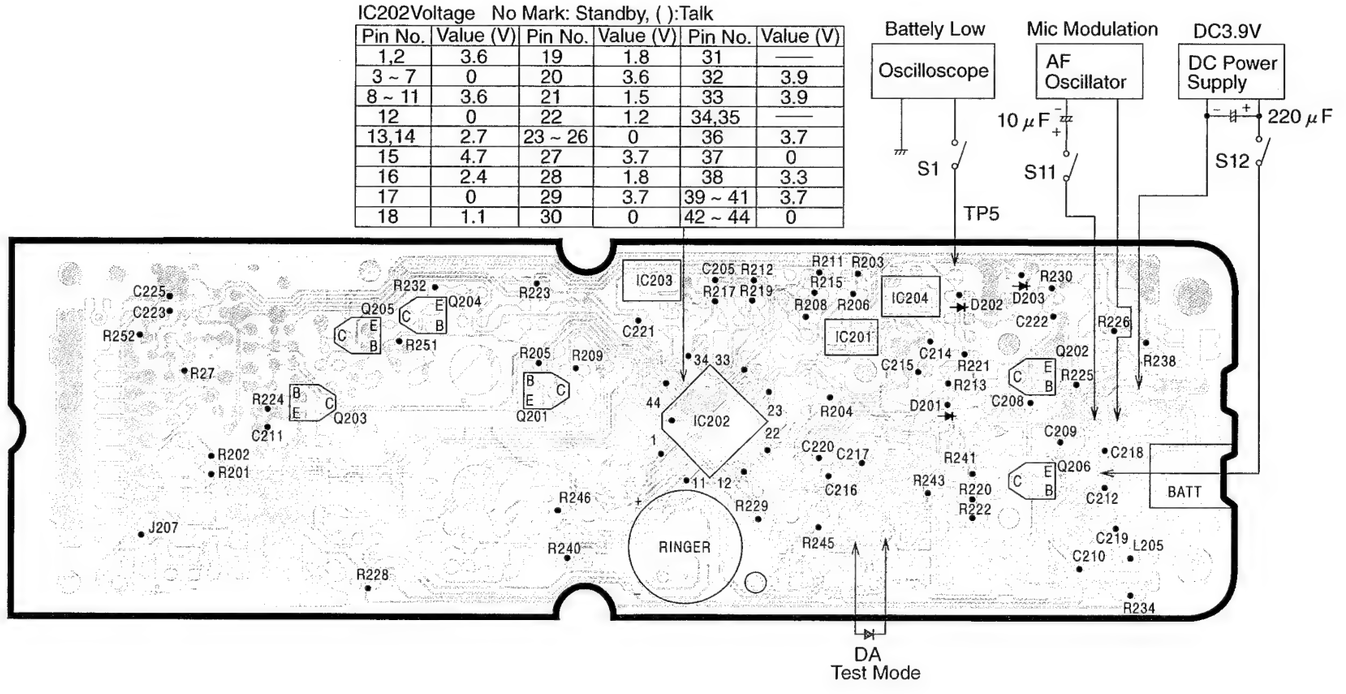
CIRCUIT BOARD AND WIRING CONNECTION DIAGRAM (HANDSET)

(Flow Solder Side View)

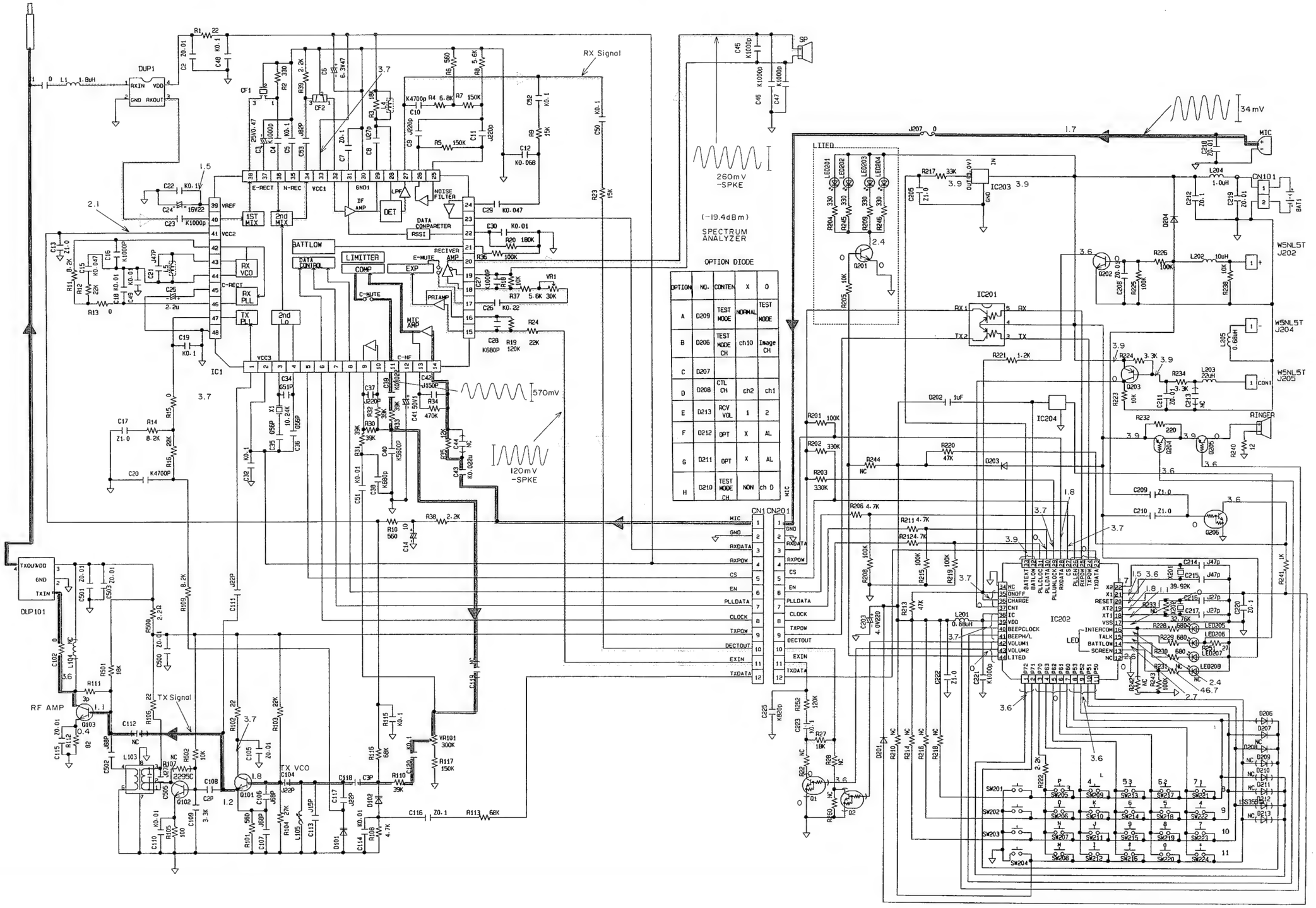


IC202Voltage No Mark: Standby, ( ):Talk

Pin No.	Value (V)	Pin No.	Value (V)	Pin No.	Value (V)
1,2	3.6	19	1.8	31	——
3 ~ 7	0	20	3.6	32	3.9
8 ~ 11	3.6	21	1.5	33	3.9
12	0	22	1.2	34,35	——
13,14	2.7	23 ~ 26	0	36	3.7
15	4.7	27	3.7	37	0
16	2.4	28	1.8	38	3.3
17	0	29	3.7	39 ~ 41	3.7
18	1.1	30	0	42 ~ 44	0



SCHEMATIC DIAGRAM (HANDSET)



ADJUSTMENTS (HANDSET)

If your unit have below symptoms, adjust each item using remedy column from the table.

Symptom	Remedy
The setting of Battery Low Indicator is wrong.	Perform checks in item (A)
The base unit does not respond to a call from handset.	Make adjustment in item (B)
The base unit does not transmit or the transmit frequency is off.	Make adjustment in item (C)
The transmit frequency is off.	Perform checks in item (D)
The transmit power output is low, and the operating distance between base unit and handset is less than normal.	Perform checks in item (E)
The reception sensitivity of base unit is low with noise.	Make adjustment in item (F)
Does not link between base unit and handset.	Perform checks in item (G), (H)
The reception level is high or low.	Make adjustment in item (I)
The transmit level is high or low.	Make adjustment in item (J)

Unit condltion:

1. Remove the antenna lead wire from P.C. Board of handset.
2. Power Supply: DC 3.9V
3. Volume: HIGH (When P.C. Borad of handset is in test mode, volume condition is high.)
4. Speaker Load: 130Ω

CH	TX Frequency	RX Frequency
CH10	40.000 MHz	30.300 MHz
CHA	40.050 MHz	30.375 MHz
CHB	———	30.020 MHz

How to set the test mode.

CH10 Test Mode

1. After connecting the diode D209,DA and apply a power supply DC 3.9 V.
   (The unit enters CH10 Talk)
2. Press the talk switch.
   (The unit enters CH10 standby)
3. Press the Talk Switch.

4. Press the channel switch,

   CH10 → CH1 → CH2·····CH9

5. Press the "AUTO" switch,

   CH10 → CHA → CH1→ CH1

	Test Mode	RX Freq.	TX Freq.	Mode
Power supply is turned ON	Test Mode (1)	CH10	CH10	Talk
Press "REDIAL" switch 1 time	Test Mode (2)	CHA	CHA	Talk
Press "REDIAL" switch 1 time	Test Mode (3)	CHB	CH1	Talk
Press "REDIAL" switch 1 time	Test Mode (4)	CH1	CH1	Talk
Press "TALK" switch 1 time	Test Mode (5)	CH1	OFF	ST-BY

KX-TC187AL-W

When replacing these parts, adjust as shown in table below.

Replace Parts	Adjustment items	Test Mode	Adjustment Point	Procedure
IC204	(A) Battery Low Confirmation	CH10 Talk **(1)**	—	1. Set S1 to ON. 2. Set the power supply voltage to DC 3.62 V, and confirm so that the reading of oscilloscope is High. 3.Set the power voltage to DC 3.52 V, and confirm so that the reading of oscilloscope is Low.
IC1, X1, L105	(B) TX VCO Voltage Adjustment	CH10 Talk **(1)**	L105	1. Set S2 to TX VCO side. 2. Adjust L105 so that the reading of digital voltmeter is 2.3 V ±0.1 V (After adjusting, set S2 to OFF).
IC1, X1, L5	(C) RX VCO Voltage Adjustment	CH10 Talk **(1)**	L5	1. Set S2 to RX VCO side. 2. Adjust L5 so that the reading of digital voltmeter is 3.0 V±0.1 V (After adjusting, set S2 to OFF).
X1, IC1	(D) TX frequency Confirmation	CHA Talk **(2)**	—	1. Set S3 to ON. 2. Confirm that the reading of frequency counter is 40.050 MHz±500 Hz .
DUP101	(E) TX Power Confirmation	CHA Talk **(2)**	—	1. Set S4 to ON (S3:OFF). 2. Output level should be between ≧480 mV on RF VTVM (50Ω load).
L4,DUP1	(F)RX Adjustment (Detector Output) (2nd IF Output)	CHA Talk **(2)**	L4	1. Set S5 to ON (S3, S4, S8: OFF). 2. Apply a 60 dB μVemf output from S.S.G. (modulation frequency 1 kHz, dev. 3kHz) 3. Adjust L4 so that the reading of DC voltmeter 0.9 ±0.05 V 4. Set S7 to ON. 5. Apply a 60 dB μVemf output from S.S.G. (modulation frequency 1kHz, dev. 3 kHz) 6. Comfirm 2nd IF output so that its reading of RF VTVM is maximum output (10~30 mV).
	(I) Noise Squelch Conformation	CHA Talk **(2)**		1. Procedure 1. + Press S1 twice to set CHB. 2. Apply a 40 dB μVemf output from S.S.G. (modulation frequency 6.0kHz, dev. 12kHz). 3. Oscilloscope switches High. 4. Apply a 40 dB μVemf output from S.S.G. (modulation frequency 6.0 kHz, dev. 0 kHz). 5. Oscilloscope switches Low.
	(G) Carrier Sensitivity Confirmation	CHB Talk **(3)**	—	1. Procedure 1. + Press S1 third times to set CHC. 2. Apply a 30 dB μVemf output from S.S.G. (modulation frequency 1 kHz, dev. 3 kHz). 3. Oscilloscope switches Low. 4. Apply a 15 dB μVemf output from S.S.G. (modulation frequency 1 kHz, dev. 3 kHz). 5. Oscilloscope switches High.
	(H) Data Moudulation Confirmation	CHA Talk	—	1. Set S9 to ON. 2. Keep pressing the flash button. 3. Confirm for a 3.5~6.5 kHz FM Deviation Meter reading.
VR1	(I) Speaker Output Level Adjustment	CHA Talk	VR1	1. Set S10, S6 to ON. 2. Apply a 40 dB μVemf output from S.S.G.(modulation frequency 1kHz, dev. 3kHz). 3. Adjust VR1 so that the reading of AF VTVM is – 28±0.5 dBm. (distortion: less than 6%) (volume: High)
VR101	(J) MIC Modulation Factor Adjustment	CHA Talk	VR101	1. Set S9, S11 to ON. 2. Apply a MIC signal (1kHz, – 40 dBm at 600 Ω load). 3. Adjust VR 101 so that the reading of FM Deviation Meter is 2.5 kHz±0.1 kHz.

The connections of adjustment equipments are as shown in page 30.

RF SPECIFICATION

BASE UNIT

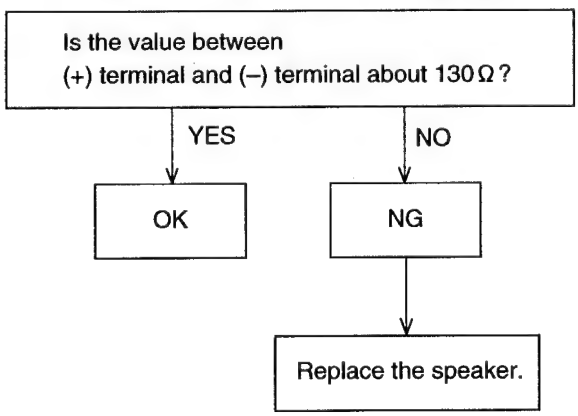
Item	Value	Refer to —.	Remarks
TX Frequency	30.350 MHz±500Hz	Page 20 (C)	
TX Power	≧ 650mV	Page 20 (D)	
TX Modulation factor	3.0±0.1kHz	———	
TX Modulation Distortion	Less than 7%	———	
Line Modulation factor (Max.)	4.0±0.1kHz	———	
Data Modulation factor	5±1.5kHz	———	

HANDSET

Item	Value	Refer to —.	Remarks
Practical Sensitivity	Less than 5 dB μV	———	at CHA
Carrier Sensitivity	Into 15~30 dB μV	Page 32 (G)	Low → High at CHB
TX Frequency	40.050 MHz±500Hz	Page 32 (D)	at CHA
TX Output	Over 480 mV	Page 32 (E)	at CHA (Antenna soldering point 50Ω Load)
Data Modulation factor	3.5 kHz/dev~6.5 kHz/dev	Page 32 (H)	at CHA
MIC Modulation factor	2.5 kHz/dev~0.9 kHz/dev	Page 32 (J)	at CHA (MIC terminal –40dBm Input)

HOW TO CHECK THE HANDSET SPEAKER

1. Use a digitial voltmeter, and set the selector knob to ohm scale.
2. Put the probes at the speaker terminals as shown in Fig.7
3.



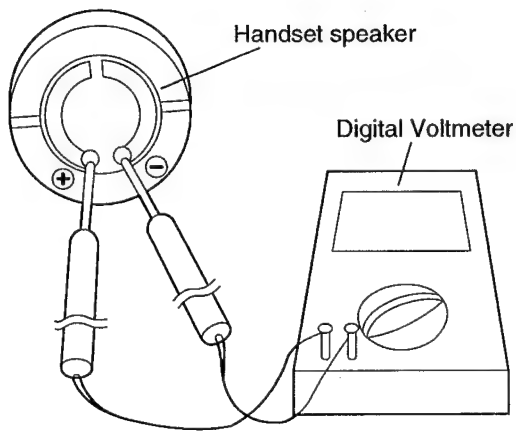
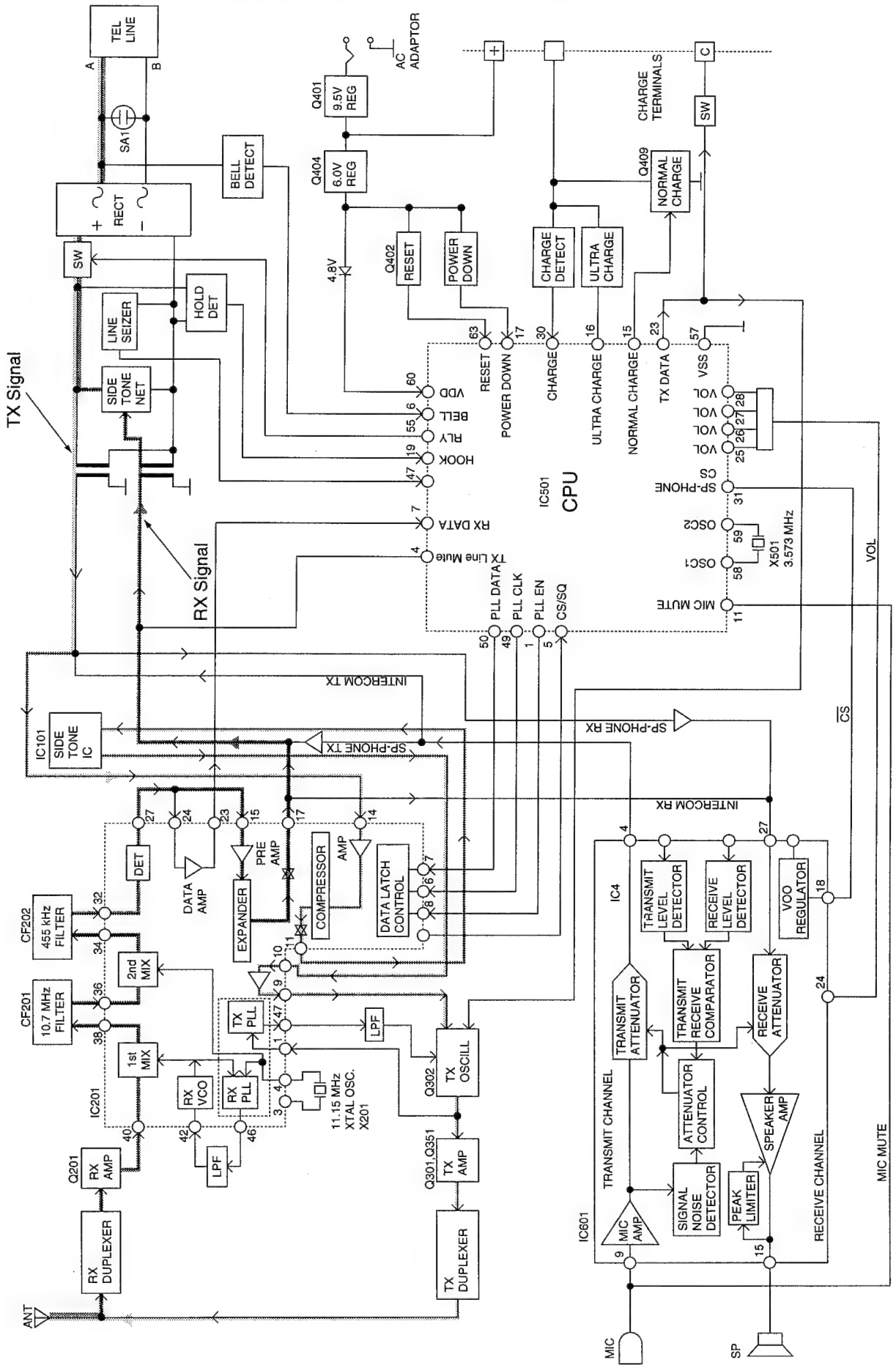


Fig. 7

BLOCK DIAGRAM (BASE UNIT)

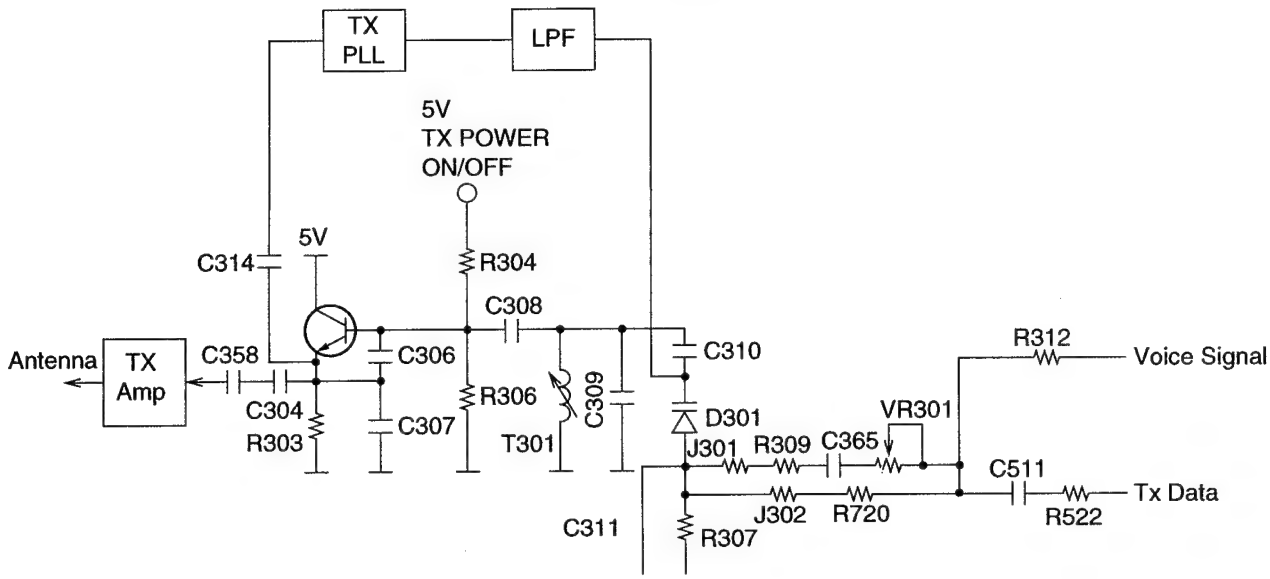


NEW CIRCUIT OPERATION (BASE UNIT)

■ TRANSMITTER CIRCUIT

The voice signal or the data signal sent to the handset is applied in the anode of the variable capacitor diode (VARICAP) D301.
VR301 is used for changing the voice signal level,thus changing the modulation level.

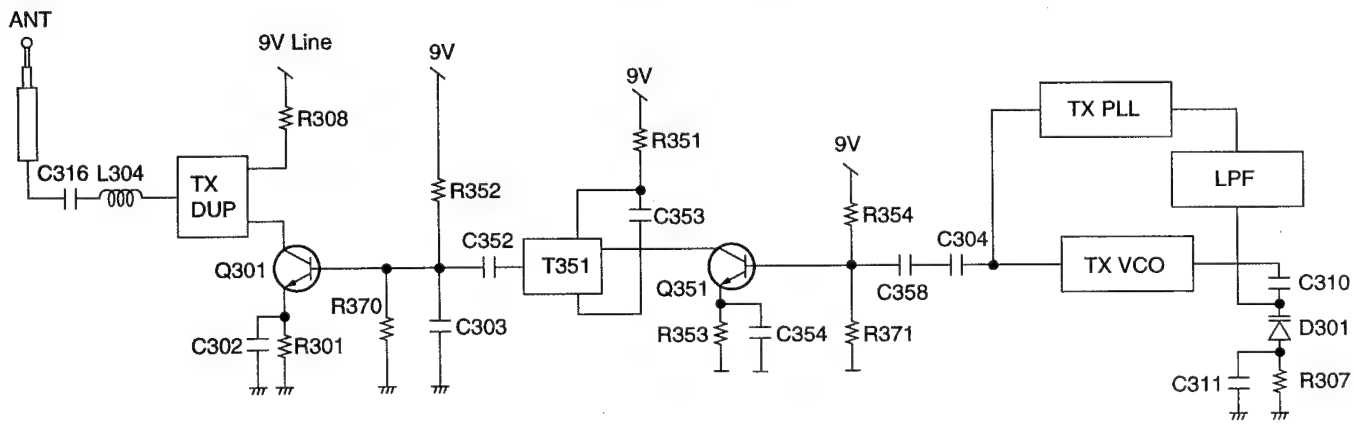
Circuit Diagram



■ TRANSMITTER OUTPUT AMP CIRCUIT

The signal which is oscillated at TXVCO is amplified by Q301,which is biased by the TX duplexer T351.
The signal passes through the duplexer and it is radiated from the antenna.

Circuit Diagram



NORMAL CIRCUIT OPERATION (BASE UNIT)

■ TELEPHONE LINE INTERFACE

Circuit Operation:

• ON HOOK

Q1 is open, and therefore cuts the DC loop current and cuts the voice signal. The unit is consequently in an on-hook condition.

• SPECIFICATIONS

In the on-hook state (idle), the current flows between the telephone line and the unit is as foliows:
A → L2 → PC1 → R1 → S

The AC interface impedance is over 2.2 k| ; thus, satisfying the telephone company requirements.

■ TELEPHONE MODE OPERATION

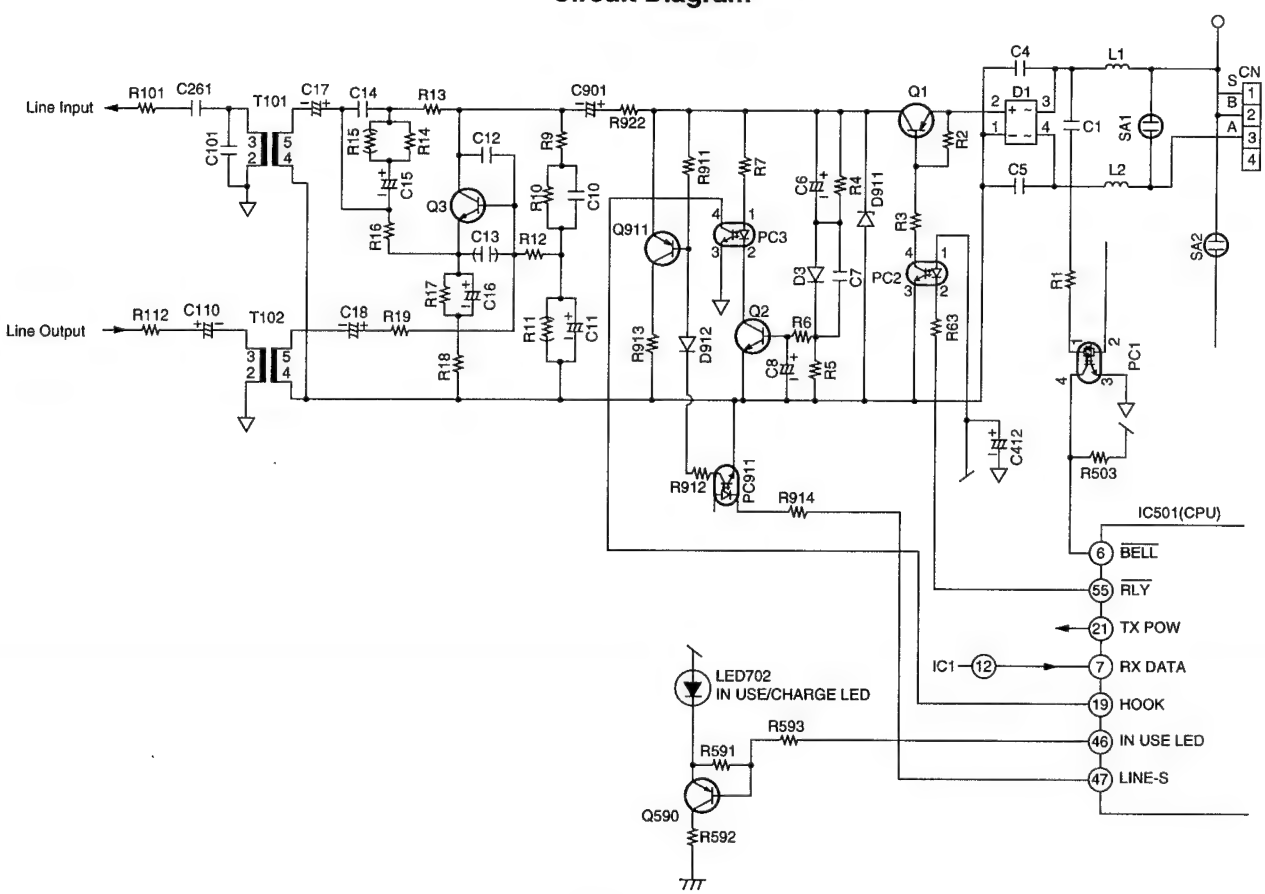
When a ring signal enters from the Line

1) The ring detection circuit, i.e., the photocoupler PC1, begins to operate and its output is input to Pin⑥of IC501 (CPU).
2) To send the ring signal to the handset, Pin㉑of IC501 enters into the transmit mode thus becoming a High and the ring data having the code set by Pin㉓of IC501 is sent to handset as a modulated output signal.
3) Upon receiving the ring data, and the handset is switched from standby to the talk mode, the base unit receives a carrier modulated by the data indicating a switch from standby to talk.This data is then demodulated at the base unit and passes through a data signal amplifier of IC201, This signal is then inputted to Pin⑦of IC501, via Pin㊺of IC501 which causes Q1 and PC2 to release the muting, and enable talk.

Circuit-making from the handset

1) When the operator of the handset presses the talk button, data is transmitted to the base unit. This data is then demodulated by the base unit and passed through data signal amplifier of IC1 and enters Pin⑦of IC501.
2) When the codes coincide, Pin㉑of IC501 becomes a "High". At this time the transmit condition is enabled and the photocoupler PC2 is turned on.
3) An IN USE signal is sent out from Pin㊻of IC501, thus dimly lighting the IN USE/CHARGE LED (IND5).

Circuit Diagram

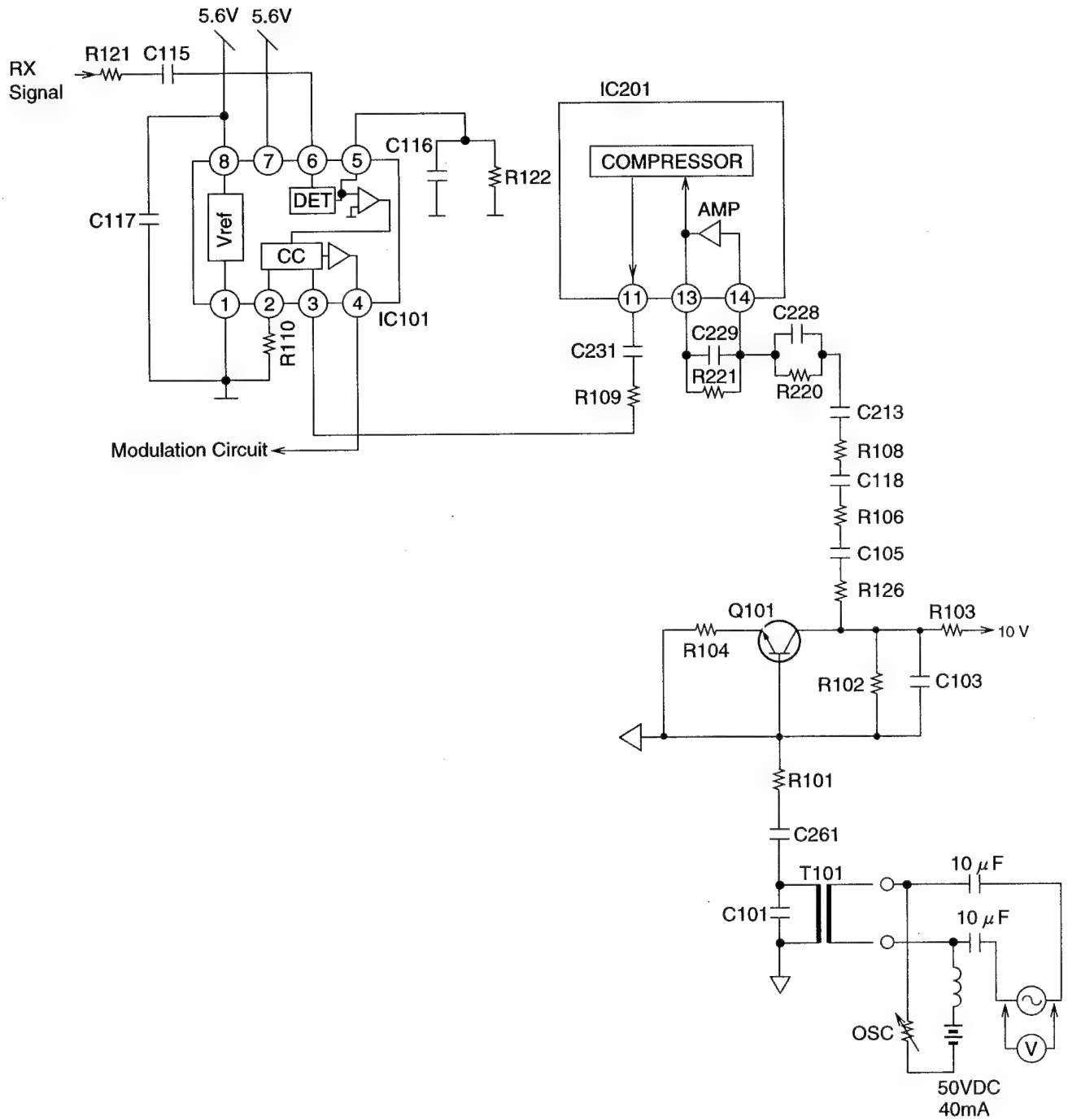


■ TRANSMITTER SIGNAL CIRCUIT

Circuit Operation:

1. The signal input from the TEL LINE goes through tel interface line transformer T101→Q101→R108→C213→(C228, R220) and it is input to the signal amplifier of IC201, pin ⑭.
This amplifier is connected in a limitter configuration (by using diodes D202 and D203).
Signal goes through the compressor and it is output in the pin ⑪ of IC201. Then it is input to the IC101 (Sidetone IC) and goes out to the modulation circuit.
The sidetone IC is an attenuator,and its attenuation level depends on the signal level received on its pin ⑥ (signal received from the portable unit, that will be sent to the Tel Line).
When the signal output to the telephone line is high, the signal input from the telephone line will be attenuated by this circuit, thus decreasing the sidetone level.

Circuit Diagram

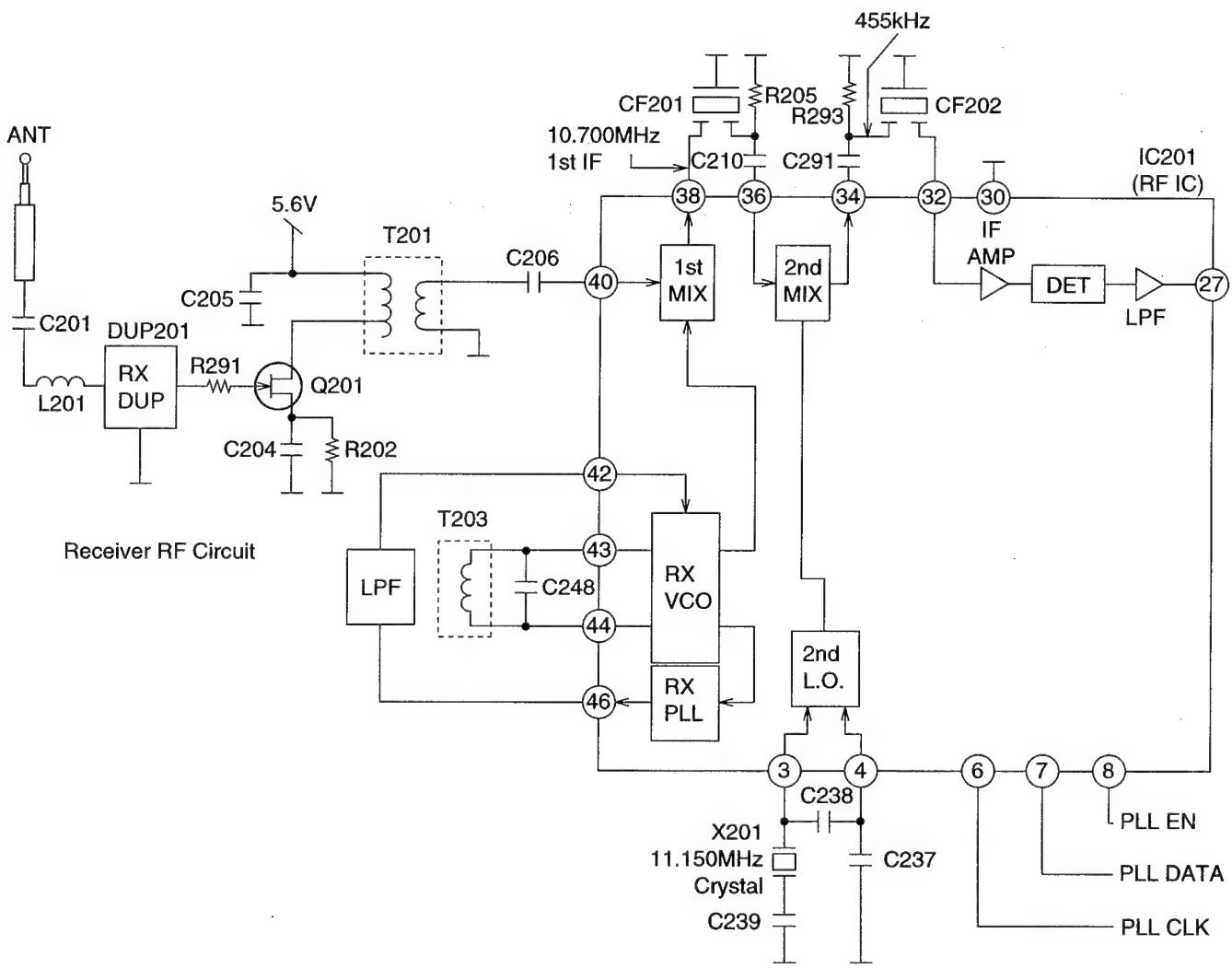


■ RECEIVER RF IF CIRCUIT

Circuit Operation:

The signal of 39.7~40.0 MHz band (39.775~40.000MHz) which is input from ANT is filtered at DUP201, passes through the filter AMP of 40 MHz band at T201 and Q201, and is input to Pin(40) of IC201.
RX VCO which oscillates at T203 and Pins(42), (46) of IC201 is input to program control at inside of IC201, 1st local frequency is controlled to assigned channel by serial data which is output, from Pins(1), (49) and (50) of IC501 (CPU), makes loop with Phase Detector Out and RX VCO, and locks 1st local frequency.
The input signal of Pin(40) of IC201 and 1st local frequency output from RX VCO are mixed at inside of IC201, then it passes through CF201, and 1st IF frequency of 10.700 MHz is generated. The 11.150 MHz and 10.700 MHz which are oscillated at X201 and Pins (3), (4) of IC201 are mixed at inside of IC201 and filtered at CF202, and 2nd IF 455 kHz is output.

Circuit Diagram

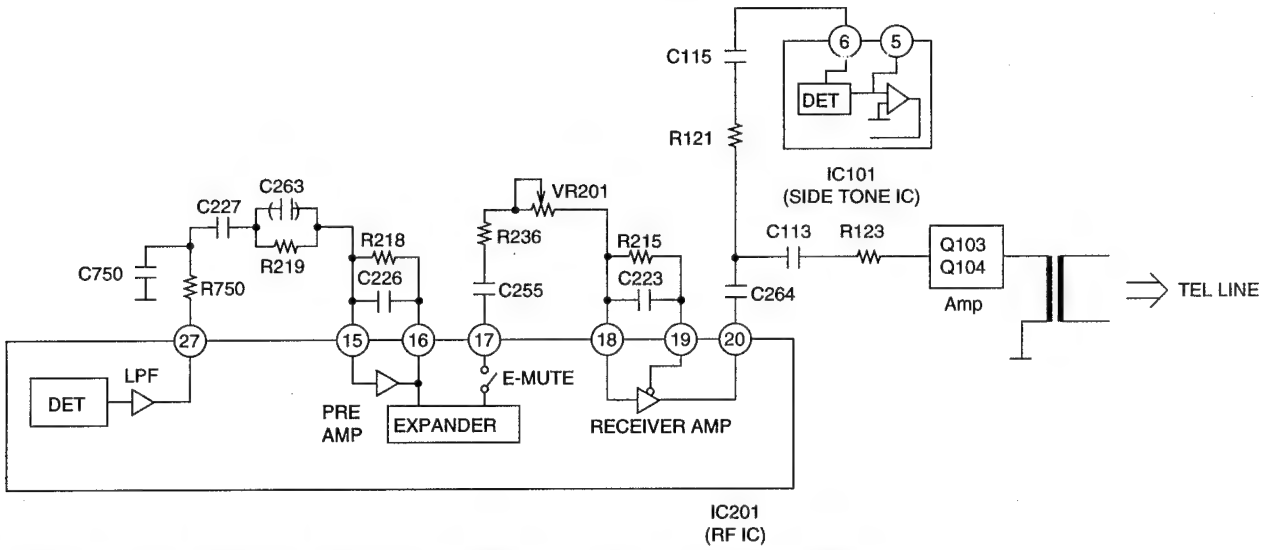


■ RECEIVER SIGNAL CIRCUIT

Circuit Operation:

1. The detected signal passes through R750→C227→(C263, R219) and it is input to the Pre Amplifier inside of IC201; it passes through the expander and goes out from pin⑰of IC201.
2. The signal passes through C255→R236→VR201→,and it is input to the Receiver Amplifier of IC201,on pin⑱.
3. The signal is output from the amplifier on pin⑳of IC201 and it goes thru C113 and R123, to the telephone line.
4. The signal is also input to the IC151 (sidetone IC) in pin⑥,in order to define the attenuation level of this IC.

Circuit Diagram



Note: All waveforms are measured by applying the SSG input level of reception 60 dB μV (3.0 kHz Deviation, f=1 kHz) from antenna.

■ INITIALIZATION CIRCUIT

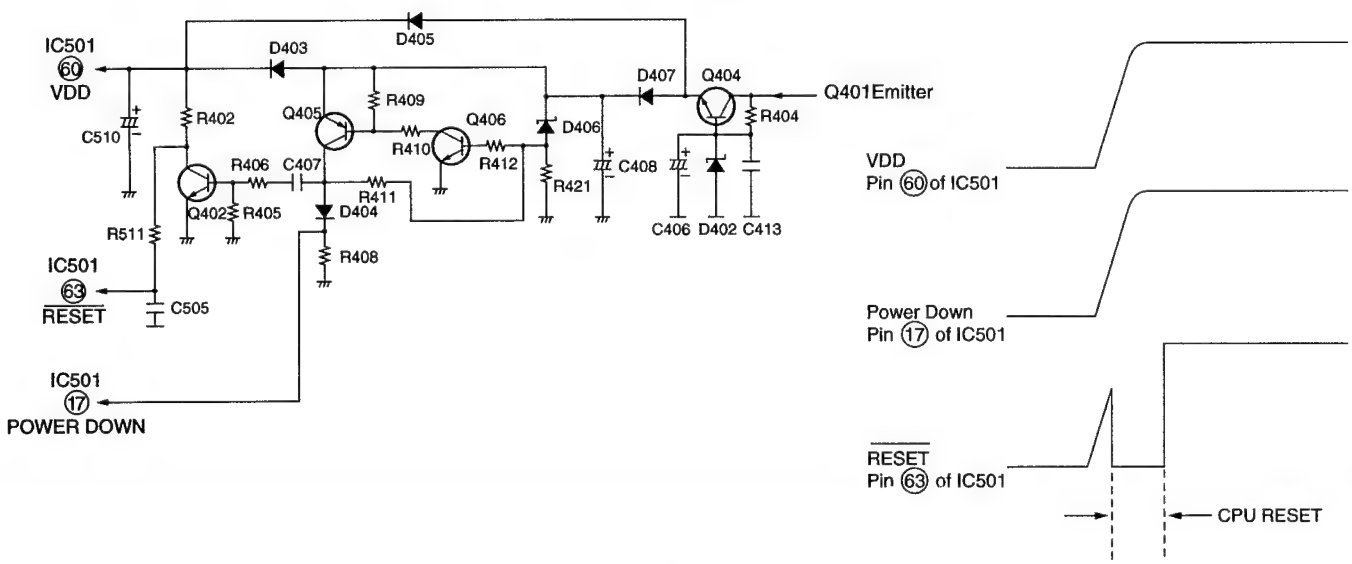
Function:

This circuit is used for initializing the CPU when the AC adaptor is connected.

Circuit Operation:

When the unit is switched ON, the voltage is shifted by D405 and power is supplied to the CPU.

Circuit Diagram



■ CHARGE DETECT CIRCUIT

Circuit Operation:

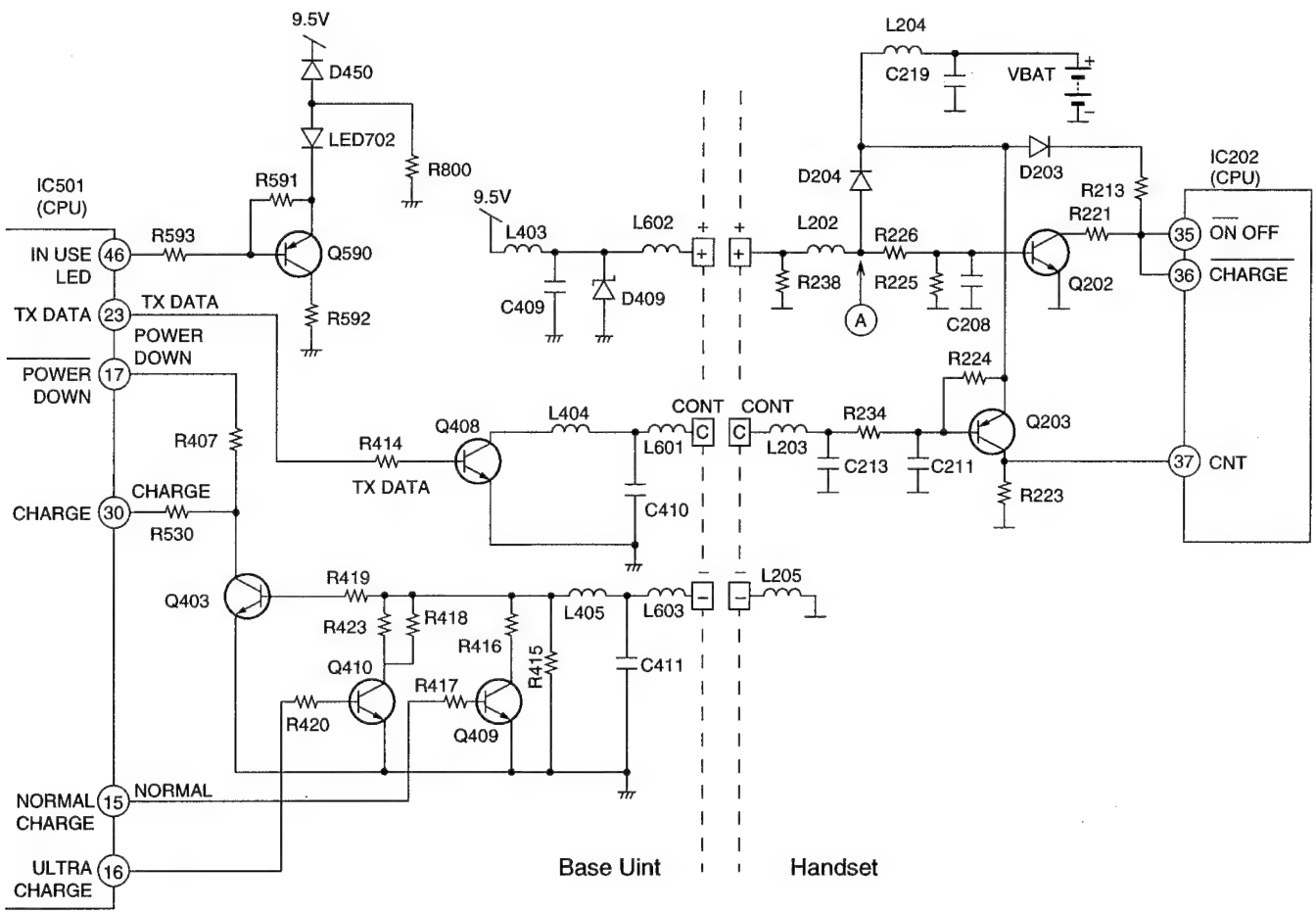
• CHARGE MODE

When charging the handset on the base unit, CH ID CODES are sent from the CONT terminal to the handset, and charging current is supplied to the handset from the battery charge contacts via R415, R416, (R418, R423) on base unit:
When ⊖ contact on base unit is input to Pin(30) of IC501 (CPU) through Q403 and LED702 (IN USE LED) light is on.
When the (A) point on the handset is High level, Q202 on handset goes on and Pin(35) and(36) of IC202 becomes Low, In this way the CPU on handset detects the fact that the battery is charged.

• Set up of the handset

When charging the handset on the base unit, the data signal is sent from CONT terminal to handset.
The Q203 switching is controlled by Pin(23) of IC501 on base unit, the sending data are CH data, ID code, tone or pulse mode data etc.
The data signal is sent to Pin(37) of IC202 (CPU) via Q203 on handset.
While charging this data continues to be sent to the CPU of handset.

Circuit Diagram

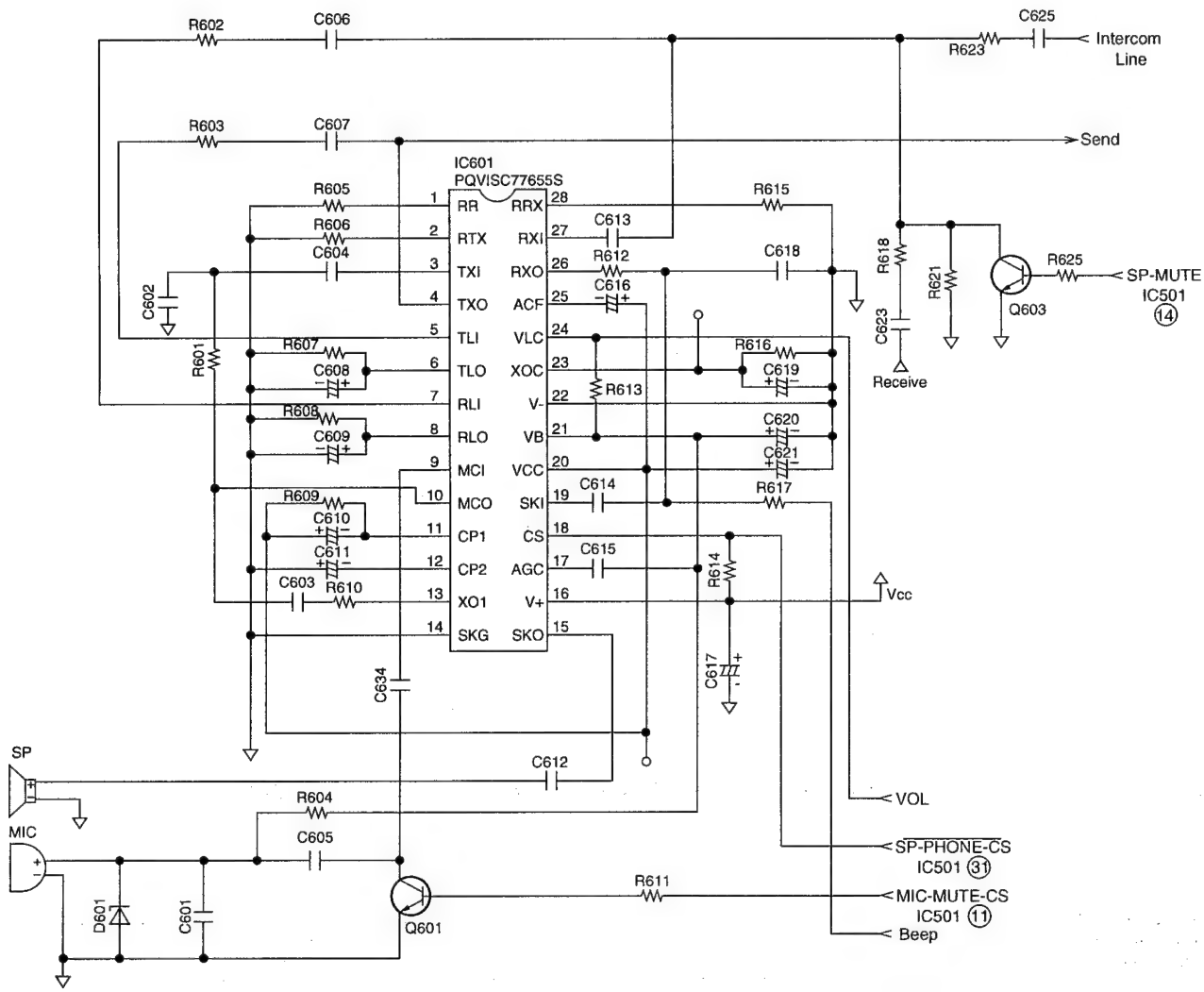


■ SPEAKERPHONE OPERATION

When a ring signal is received:

When the ring signal is received from line, photocoupler PC1 operates, the output enters Pin⑥of IC501 (CPU), Pin㉑of IC501 goes High, and the system goes into the Send mode. Also, Pin㉛of IC501 goes Low, activating IC601 (speakerphone). Next, Pin㊷of IC501, Pin⑮of IC601 output the monitor tone which enters Pin⑲of IC601 and is then output from the speaker. Subsequently, the same operation as for Line takes place.
Next, when the speakerphone switch is turned ON, the line in which the ring is ringing is selected, and Q1, goes ON, causing the line to be selected.

Circuit Diagram



■ POWER SUPPLY CIRCUIT

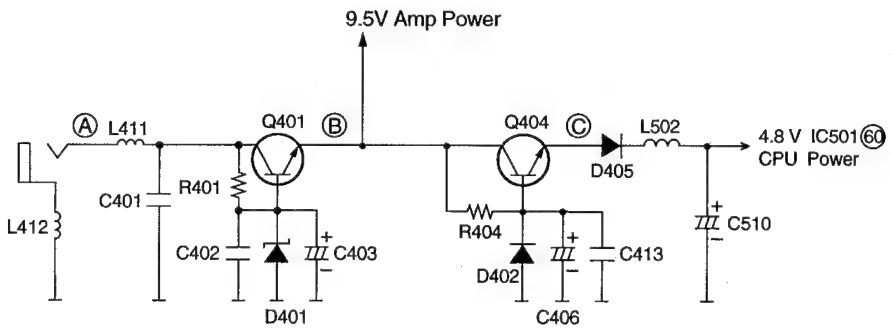
Function:

Power from the AC adaptor passes through a 2-stage regulating block consisting of Q401 and Q404 and provides system voltages of 4.8 V and 9.5 V.

Circuit Operation:

Q401 is a regulated power supply. The voltage at point Ⓑ is regulated to 9.5 V by the zener voltage of D401→Amp power.
Q402 is a regulated power supply. The voltage at point Ⓒ is regulated to 5.5 V by the zener voltage of D402.
The 5.5 V voltage is dropped by D405 to 4.8 V.

Circuit Diagram

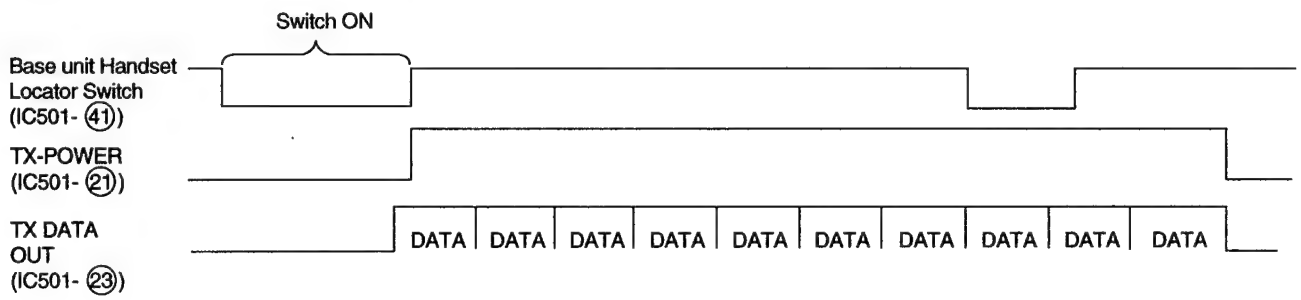


■ CPU OPERATION

1. TEL MODE

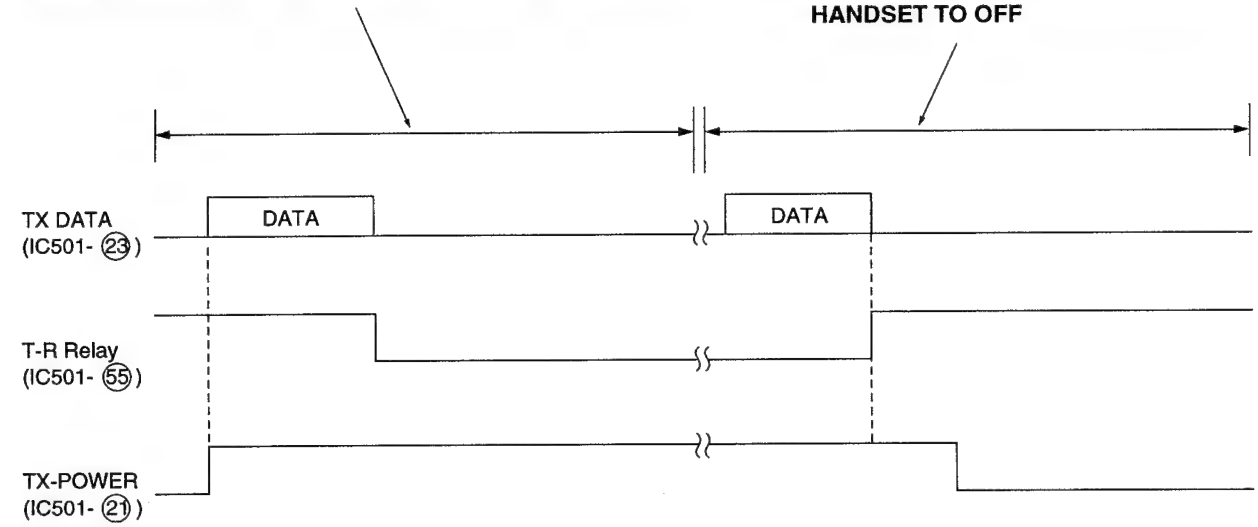
CPU Terminals / IC501 / Operation Mode	21 TX POW	23 TX DATA	55 TR-RLY
STANDBY	L	H	H
TALK	H	H	L
Base Unit → Handset Ring	H	DATA	H
Base Unit → Handset Paging	H	DATA	H
CHARGE	L	DATA	H

2. TIMING OF IC5 (CPU) OUTPUT PORT WITH THE BASE UNIT IN HANDSET LOCATOR MODE



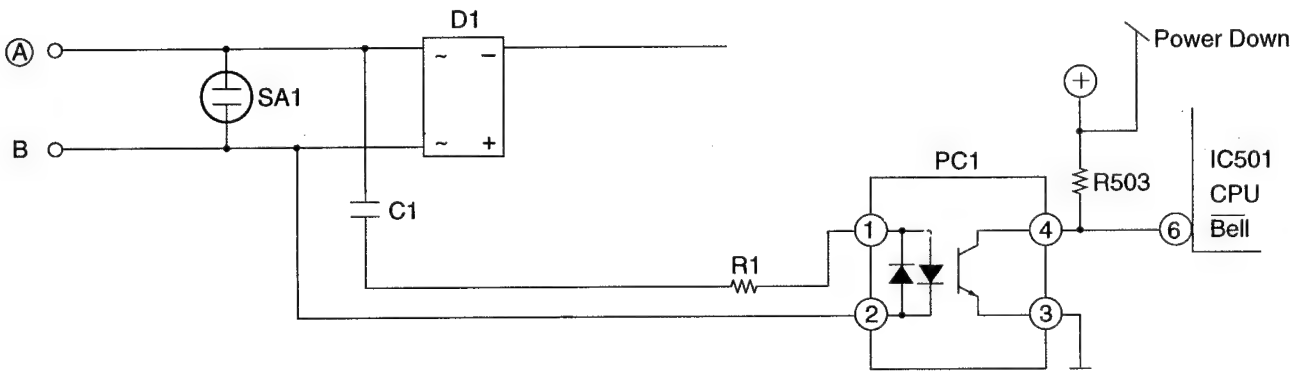
3. WHEN PRESSING THE TALK SWITCH OF THE HANDSET

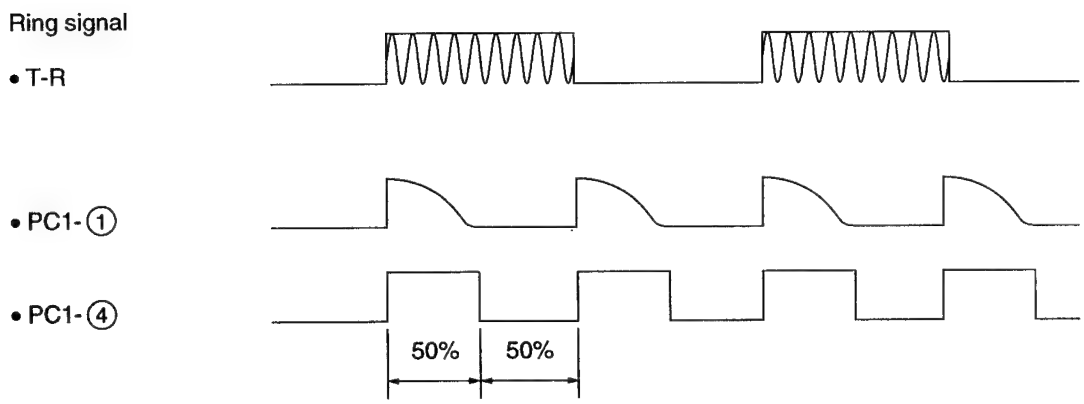
4. WHEN PRESSING THE TALK SWITCH OF THE HANDSET TO OFF



5. RESONANCE PREVENTION CIRCUIT

Circuit Diagram



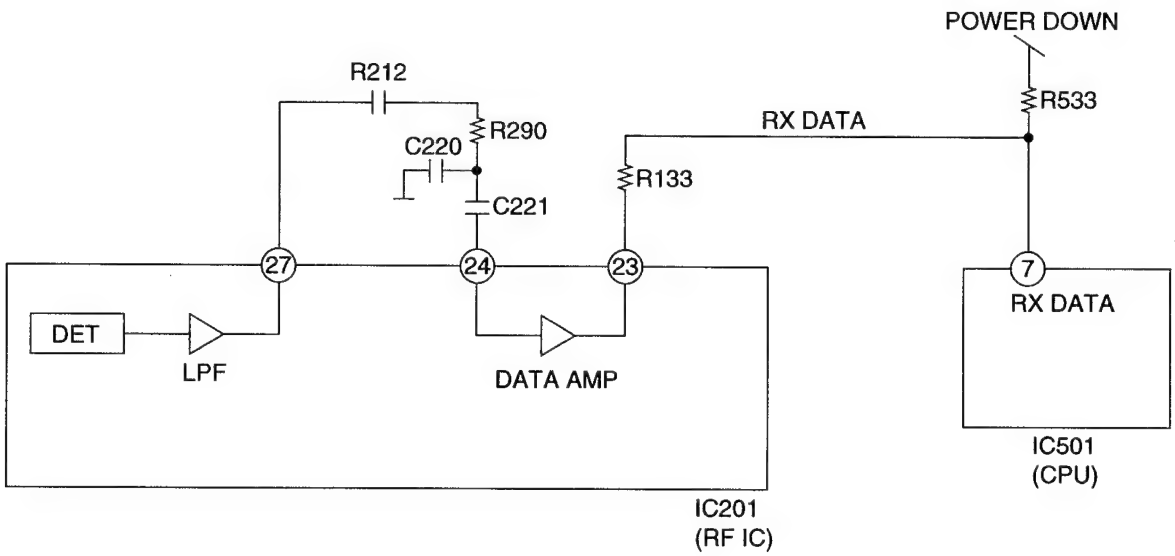


Make/break ratio when dialling with the handset: 40%: 60%
High/low ratio upon ring signal: 50%: 50%
Therefore, if the low/high ratio is greater than 45% at IC501- 6 (CPU), it is judged as a ring signal.

6. EXPLANATION OF THE DATA RECEIVE CIRCUIT

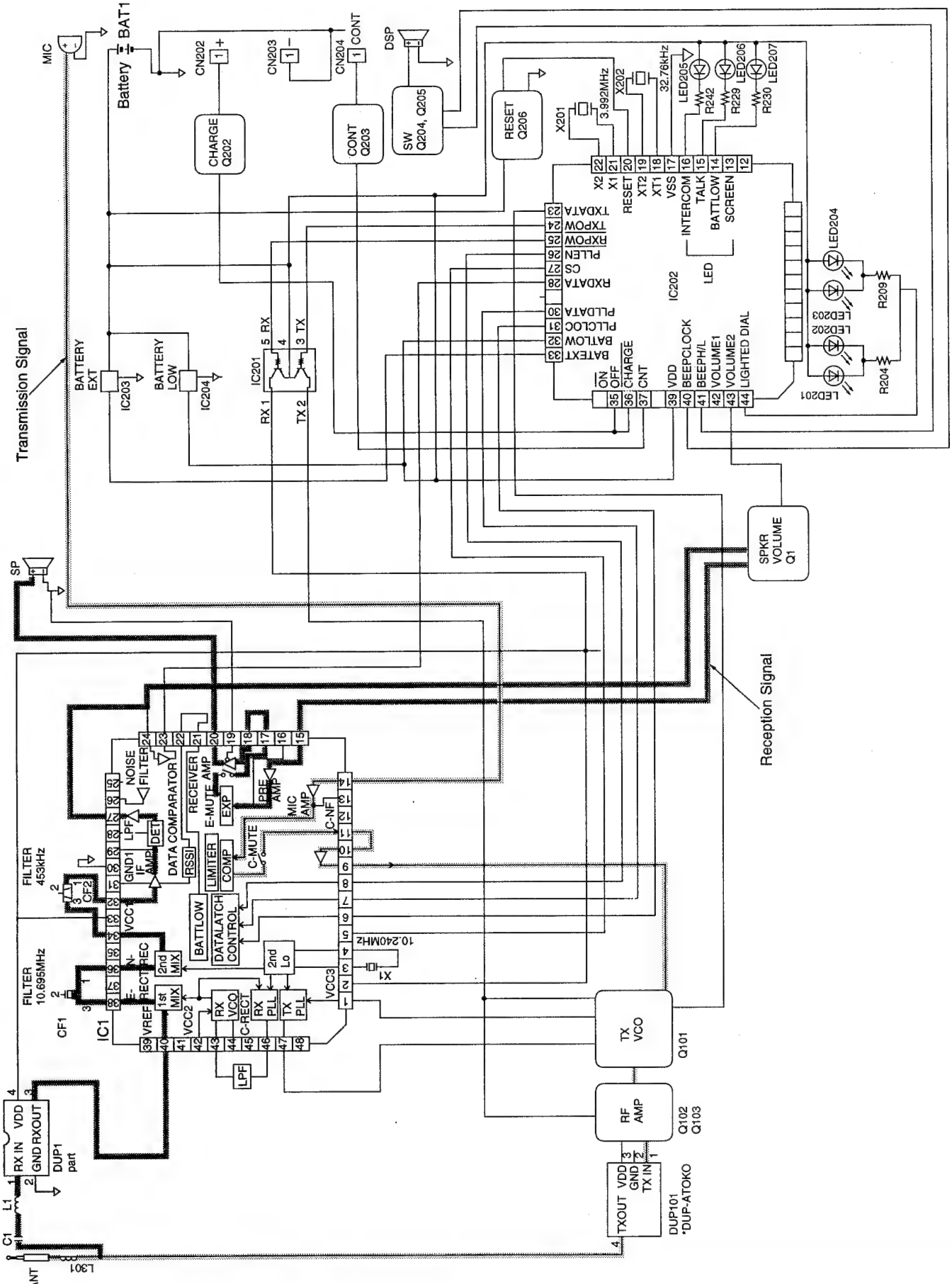
6-1. Signal Flow

Circuit Diagram



In area where the transmission power from the handset is extremely weak, noise is superimposed on the data and the chance of an error is high upon reception of the data. To help prevent this, the above circuit is used.

BLOCK DIAGRAM (HANDSET)



NEW CIRCUIT OPERATION (HANDSET)

■ RECEIVER RF IF CIRCUIT

Circuit Operation:

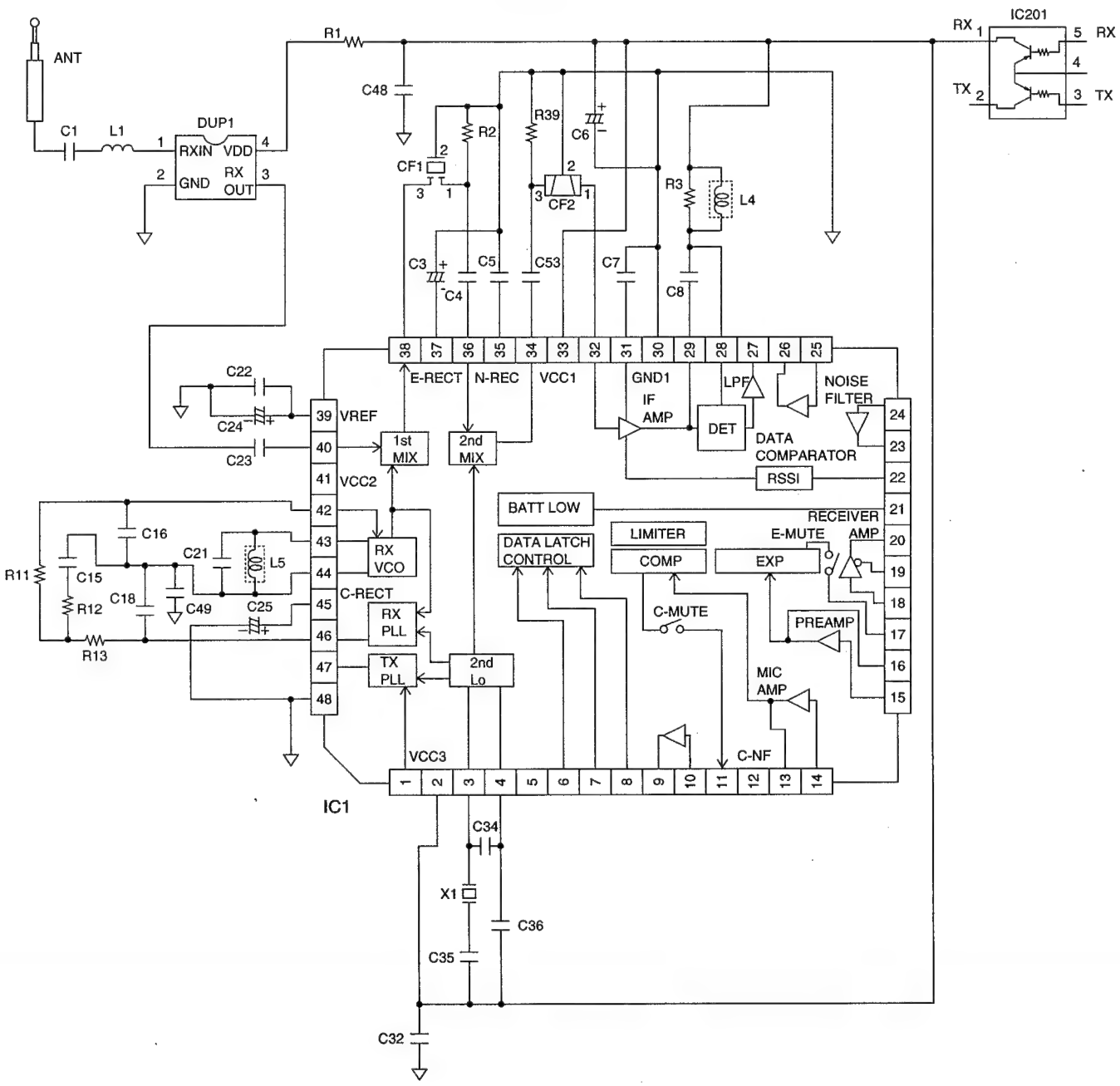
The signal of 30 MHz band (30.075 MHz~30.300 MHz) which is input from ANT is filtered by DUP1, and is input to Pin㊵of IC1.

The RX VCO which oscillates at L5 and IC1 is locked to 1st Local frequency by PLL inside IC1. (PLL is controlled by serial data output from Pin㉖,㉚and㉛of IC202.)

An input signal from Pin㊵of IC1 and 1st Local frequency output from RX VCO are mixed inside IC1, pass through CF1, and 1st IF frequency of 10.695 MHz is generated.

Further, 10.695 MHz that is filtered at CF1, and 10.240 MHz that is oscillated at X1, pass through 2nd MIXER inside IC1 and are filtered at CF2 and output 2nd IF 455 kHz.

Circuit Diagram

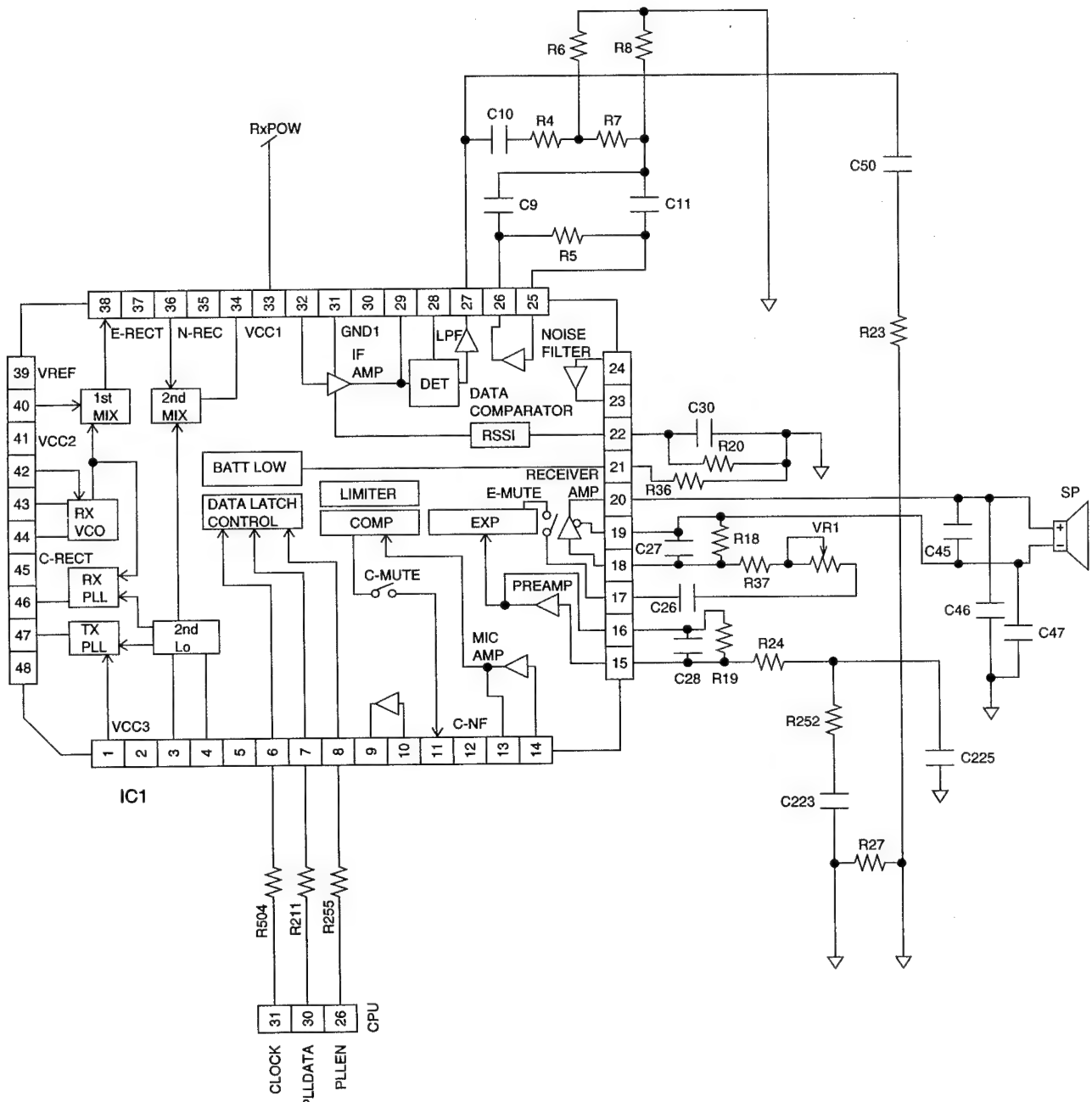


■ RECEIVER SIGNAL CIRCUIT

Circuit Operation:

After getting the 455kHz signal, it is input to Pin(32) of IC1 and passes through IF AMP and Detector Circuit, then are output to Pin(27).
It is an AF signal flows through C50, R23. Its level is switched by Q1 which are controlled by the CPU.
The signal is received at Pin(15) of IC1, then it passes through the following circuits: PREAMP, Expander and Amplifier: It goes out at Pin(20) and finally is sent to the SP.
Inside IC1, E-MUTE, C-MUTE and PLL circuits are controlled by the serial data from the CPU (from Pins(26), (31) and (32)).

Circuit Diagram

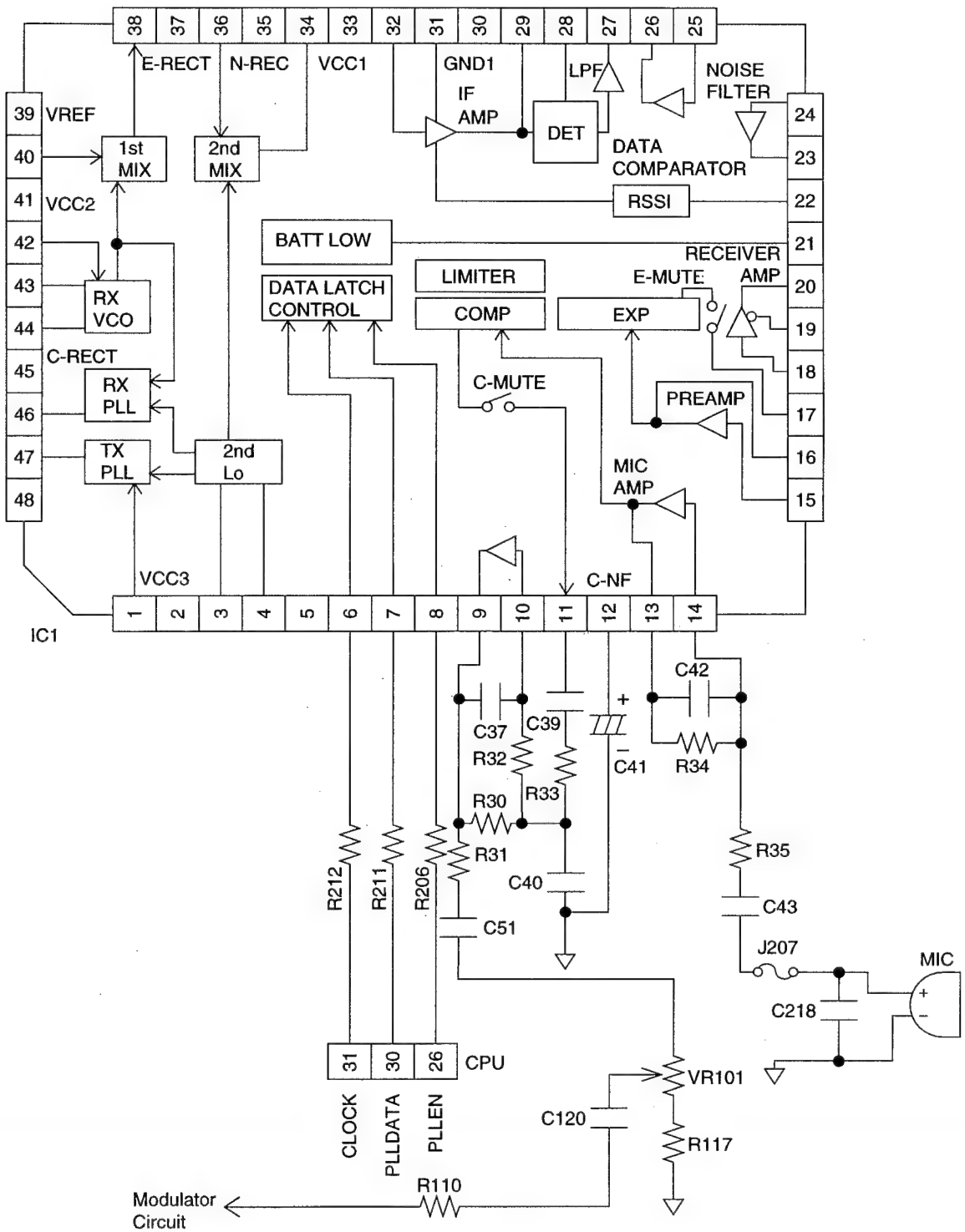


■ TRANSMITTER SIGNAL CIRCUIT

Circuit Operation:

Input signal from MIC passes through the filters arranged by C43,R35 and C42,R34 and it is input to the Pin⑭of IC1.
Inside it, the signal passes through the MIC AMP and Compressor circuits and is output to Pin⑪.
It flows through C39, R33, R30, R31, C51 and VR101, then is input to modulator circuit.

Circuit Diagram

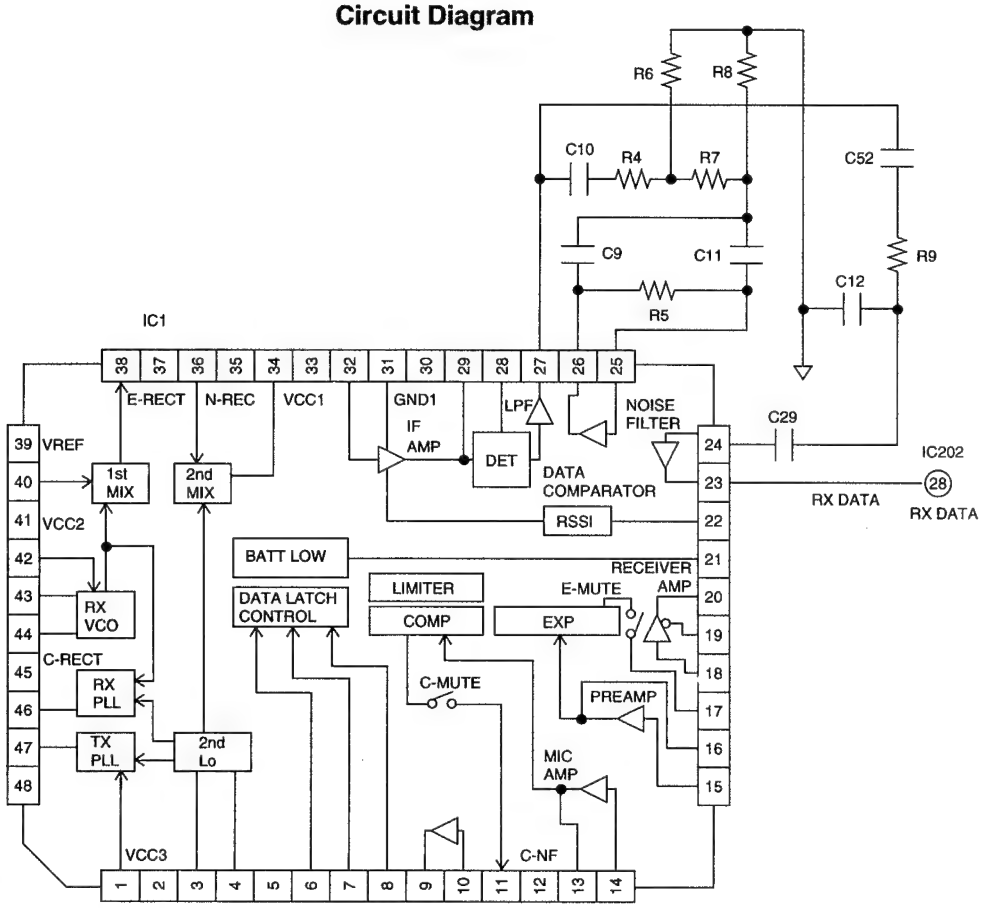


■ RECEIVER DATA CIRCUIT

Circuit Operation:

Only the data received is passed through the low pass filter formed by R9 and C12 to be input at pin(24) of IC1,where the wave form is adjusted.
The resulting signal is output from Pin(23) and sent to CPU directly.

Circuit Diagram

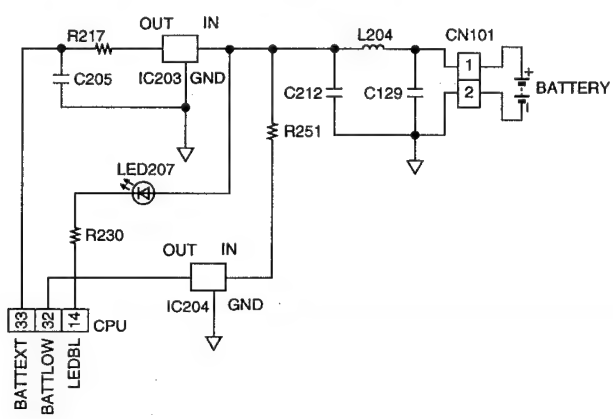


■ BATTERY LOW DETECTOR CIRCUIT

Circuit Operation:

When the battery voltage reduces to less than 3.55 V, this level is detected at the input of IC 204, so its output switches from a high state to low state.
The CPU detects this level at Pin(32) and battery low indicator lights starts flashing.
IC203 monitors the level of the battery, if this level is less than 3.0 V, the output of IC203 switches to low state, then CPU stops stops working to maintain memory.

Circuit Diagram



NORMAL CIRCUIT OPERATION (HANDSET)

■ CPU OPERATION

CPU Terminals / Operation Mode	23 TX DATA	25 RX POW	24 TX POW	41 BEEP	15 TALKLED
STANDBY	L	Intermittently H or L	H	H	H
TALK	L	L	L	H	L
Base Unit → Handset Ring	—	L	H	L	FLASHING
Base Unit → Handset Paging	—	L	H	L	H
CHARGE	L	H	H	H	H
During (TALK)	—	L	L	H	L
Handset PULSE DIAL	DATA	L	L	H	L
Handset TONE DIAL	DATA	L	L	H	L
Handset OFF MODE	L	H	H	H	H

■ RESET CIRCUIT POWER ON/OFF CIRCUIT

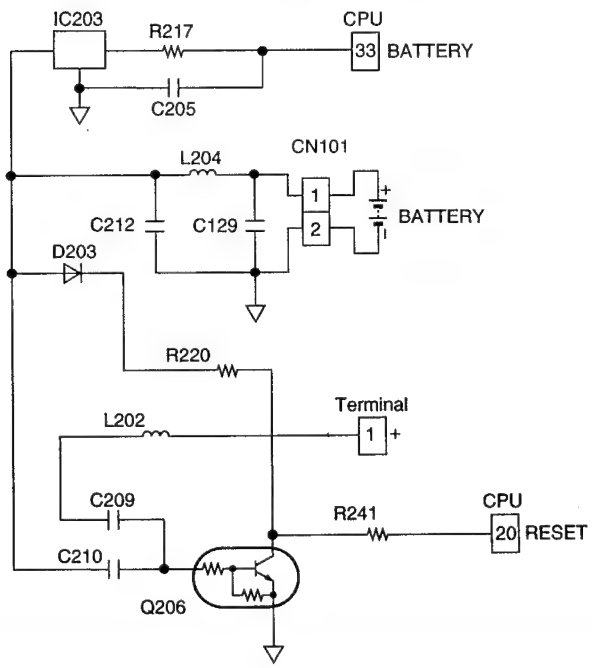
Reset circuit:

There are two ways to reset CPU.

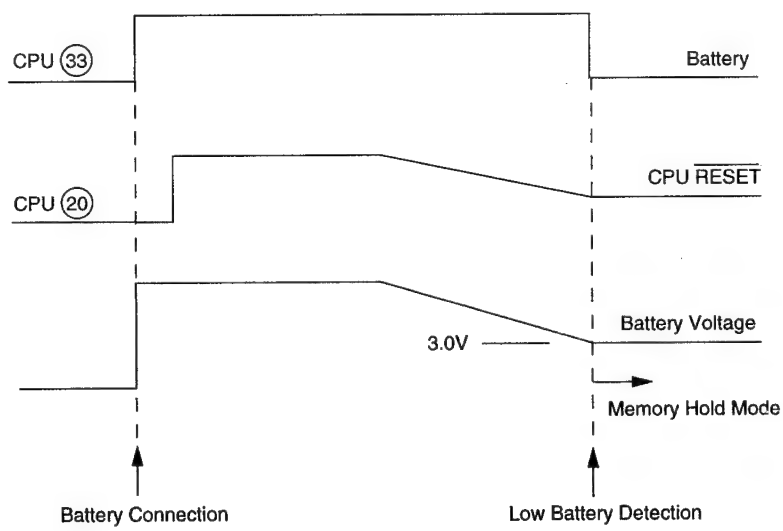
1.When the battery is connected, there is an impulse through C210 then Q206 generates an reset signal which is received in Pin⑳of CPU.

2.When the handset is charged, the impulse is sent through C209,Q206 generates the reset signal and it is sent to Pin⑳of CPU.

Circuit Diagram



Timing Chart



TROUBLESHOOTING GUIDE

Symptom	Refer to page –.	Unit for repair
The base unit does not respond to a call from handset.	20, 21	Base Unit
The base unit does not transmit or the transmit frequency is off.		
The transmit frequency is off.		
The transmit power output is low, and the operating distance between base unit and handset is less than normal.		
The reception sensitivity of base unit is low with noise.		
The transmit level is high or low.		
The reception level is high or low.		
The unit does not link.		
The base unit does not flash In Use/Charge indecator.	53	
The charge indicator does not light.	54	
The IN USE/Charge indicator does not flash.	54	
The beep is not heard from the handset.	54	
The setting of Battery Low indicator is wrong.	31, 32	Handset
The handset does not respond to a call from base unit. The handset does not transmit or the transmit frequency is off.		
The transmit frequency is off.		
The transmit power output is low, and the operating distance between base unit and handset is less than normal.		
The reception sensitivity of handset is low with noise.		
Does not link between base unit and handset.		
The reception level is high or low.		
The transmit level is high or low.		
The handset does not enter the battery save mode.	55	
The beep is not heard on the handset.	56	
The TALK indicator does not flash.	56	

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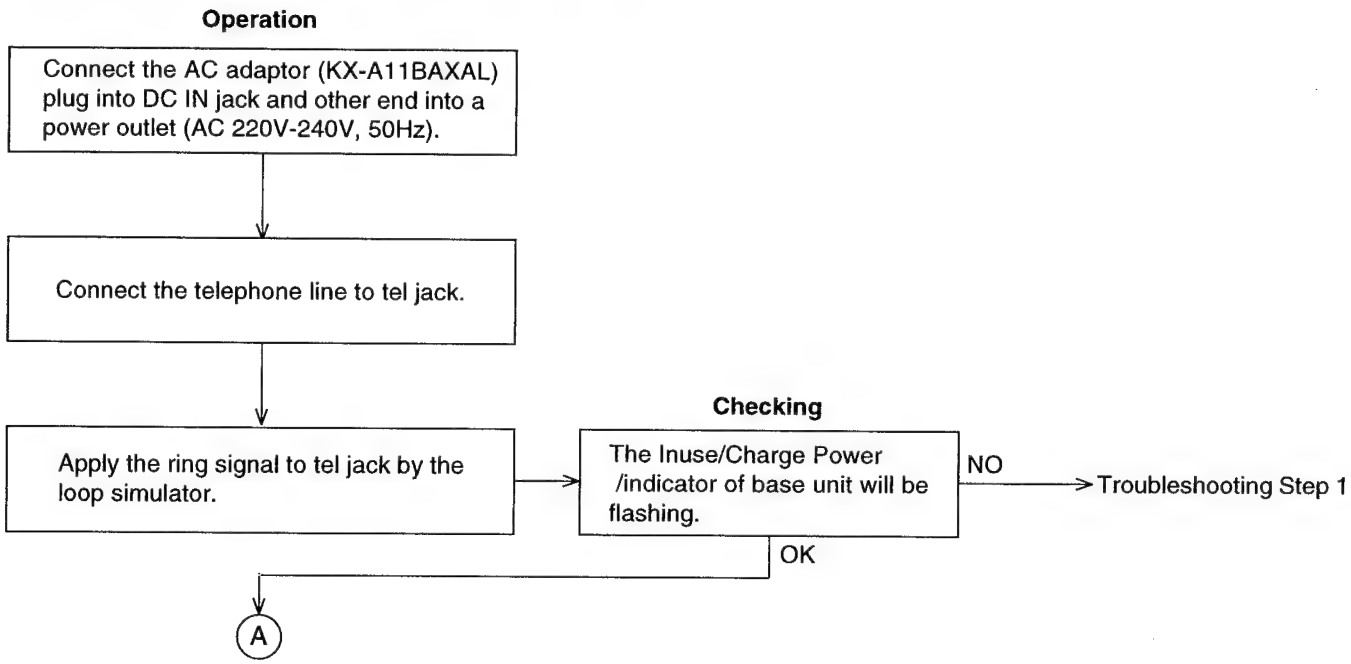
TROUBLESHOOTING GUIDE (BASE UNIT)

Base Unit Condition:

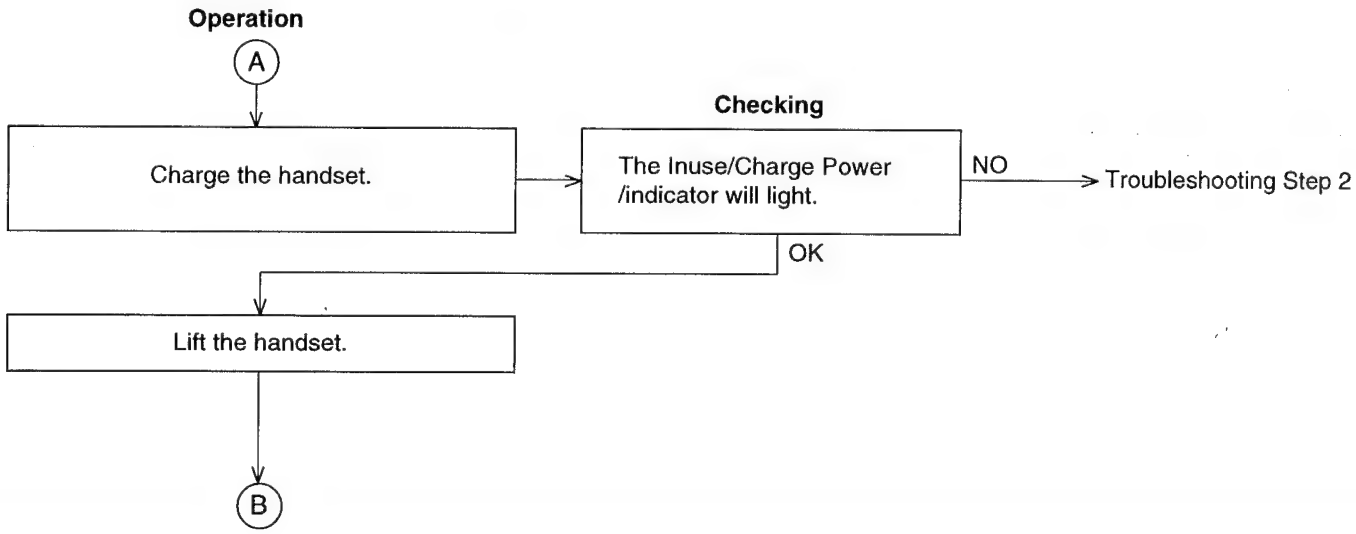
1. Set the Volume/Ringer button to "MAX".
2. Set the dialing mode selector to "Tone".

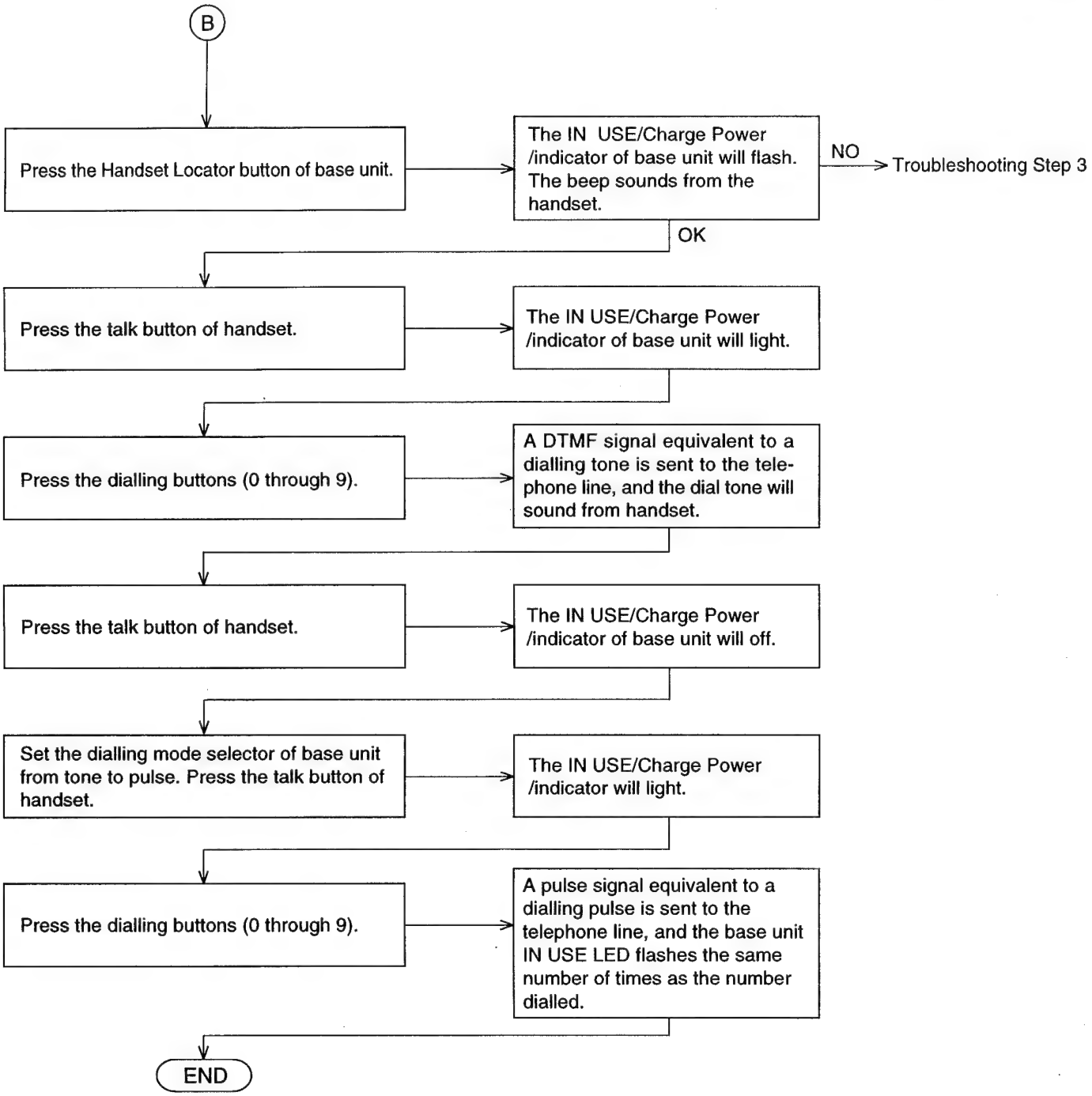
When checking the base unit only

Check the base unit as shown by following below flow chart.



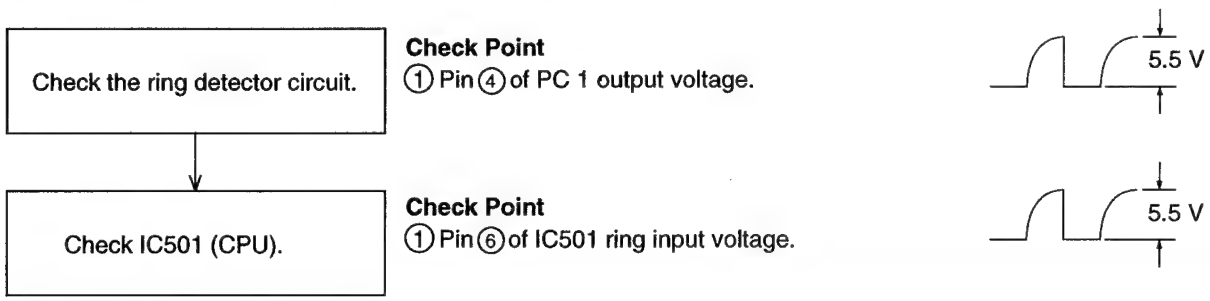
When checking the base unit and handset





Troubleshooting Step 1:

The base unit does not flash In Use/Charge indicator.



Troubleshooting Step 2: **The charge indicator does not light.**

Check the charge detector circuit.

↓

Check LED702.

Check Point

① Is the ⊖ contact of base unit is low logic level?

Troubleshooting Step 3:

1) The INUSE/CHARGE indicator does not flash.

Check IC501(CPU).

↓

Check LED702.

Check Point

① Is the pin ㊻ of IC501 (INUSE/Charge output) at a low logic level?

2) The beep is not heard from the handset.

Check the data transmission during charge mode.

↓

Check the modulation circuit (D301).

↓

Check the oscillation circuit.

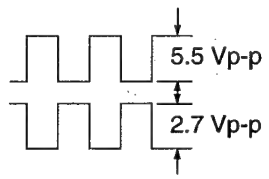
↓

Check the transmitter amplifier.

Check Points

① Pin ㉓ of IC501 data output voltage.

② Collector of Q408 output voltage.



Check during charge mode

Check Point

① Is the base of Q302 (TX VCO) 4 V?

② Is the Pin ⑤ of IC1 3.2 V?

③ Are the Pins ⑥, ⑦, ⑧ of IC201 (PLL control)?

Check Point

① Is the base of Q301 (Final power amplifier) 2 V?

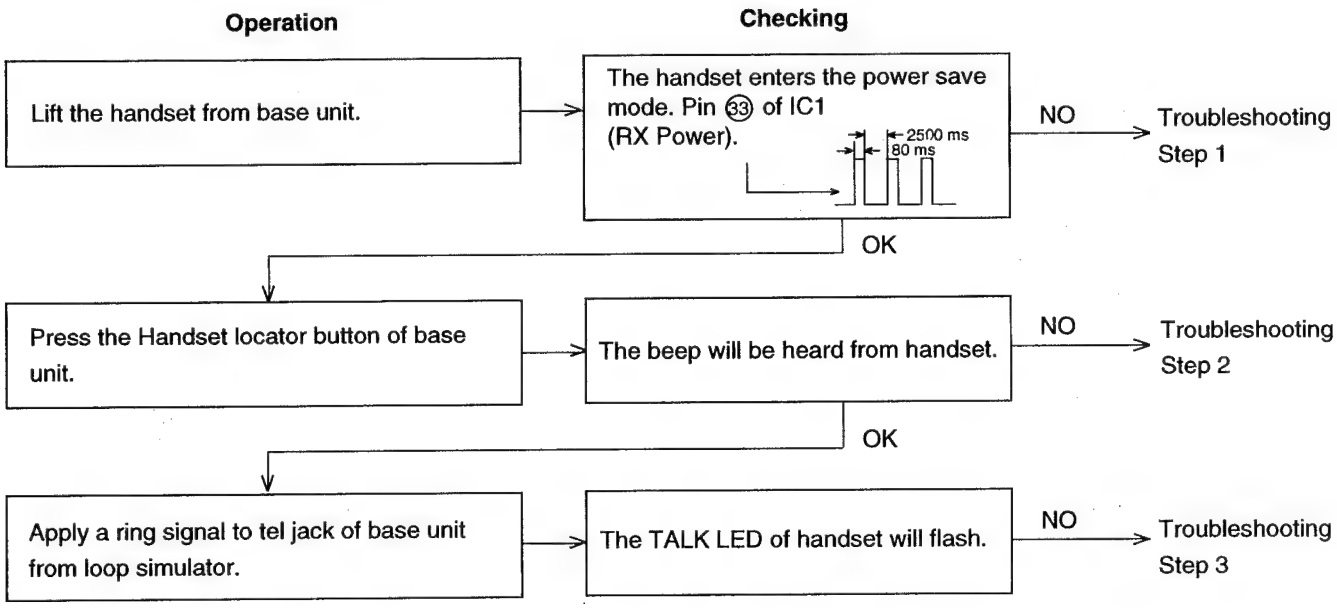
TROUBLESHOOTING GUIDE (HANDSET)

Use the right base unit for this troubleshooting.
Charge the battery of the handset by the base unit.

Base unit condition:

1. Connect the AC Adaptor (KX-A11BAXAL) plug into DC IN jack and the other end into a power outlet (AC 220V–240V, 50Hz).
2. Connect the loop simulator (DC 48 V) to tel jack.

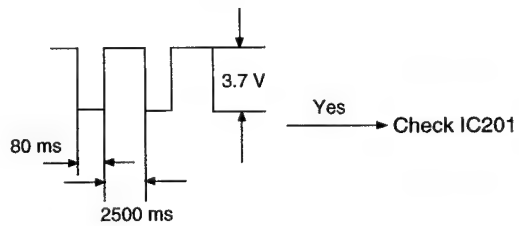
Check the handset as shown by following below flow chart.



Troubleshooting Step 1: **The handset does not enter the battery save mode.**

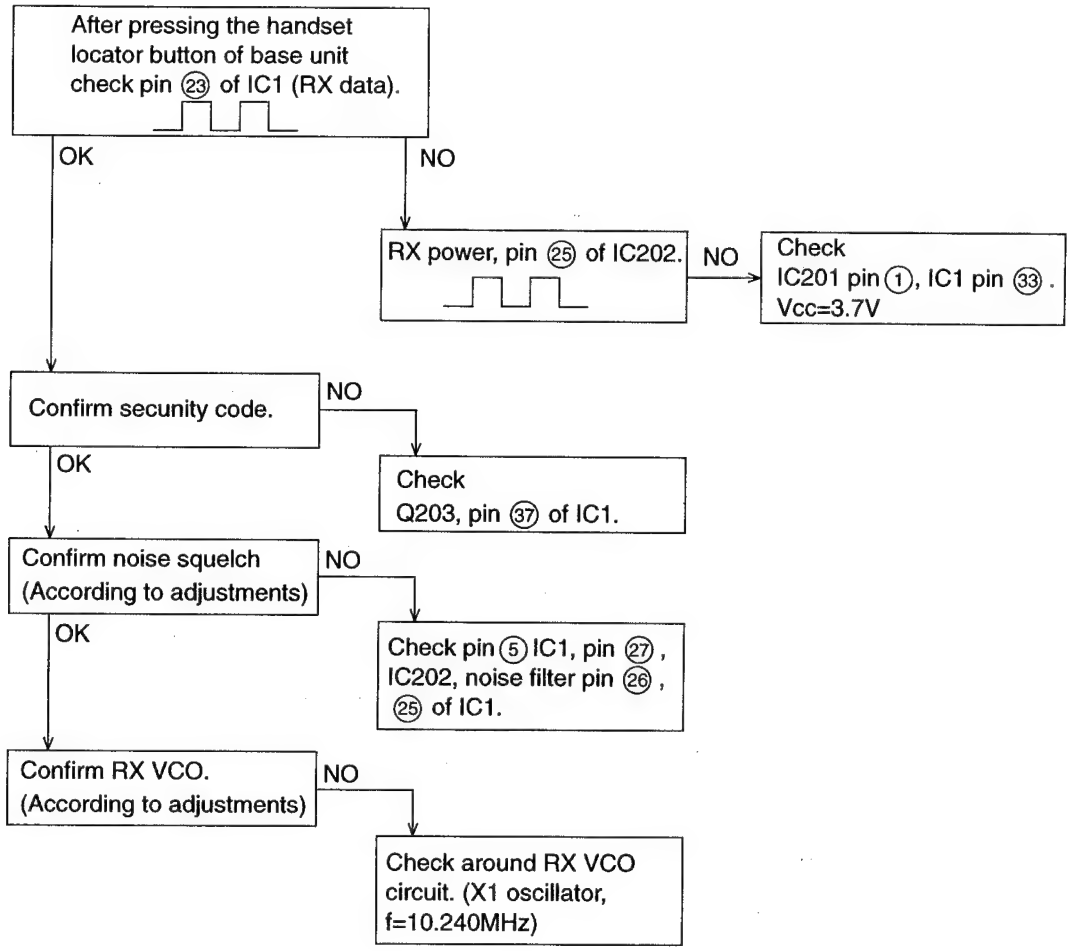
Check point

(1) Pin ㉝ of IC1
RX power output voltage



Troubleshooting Step 2: **The Beep is not heard on the Handset.**

Check Points

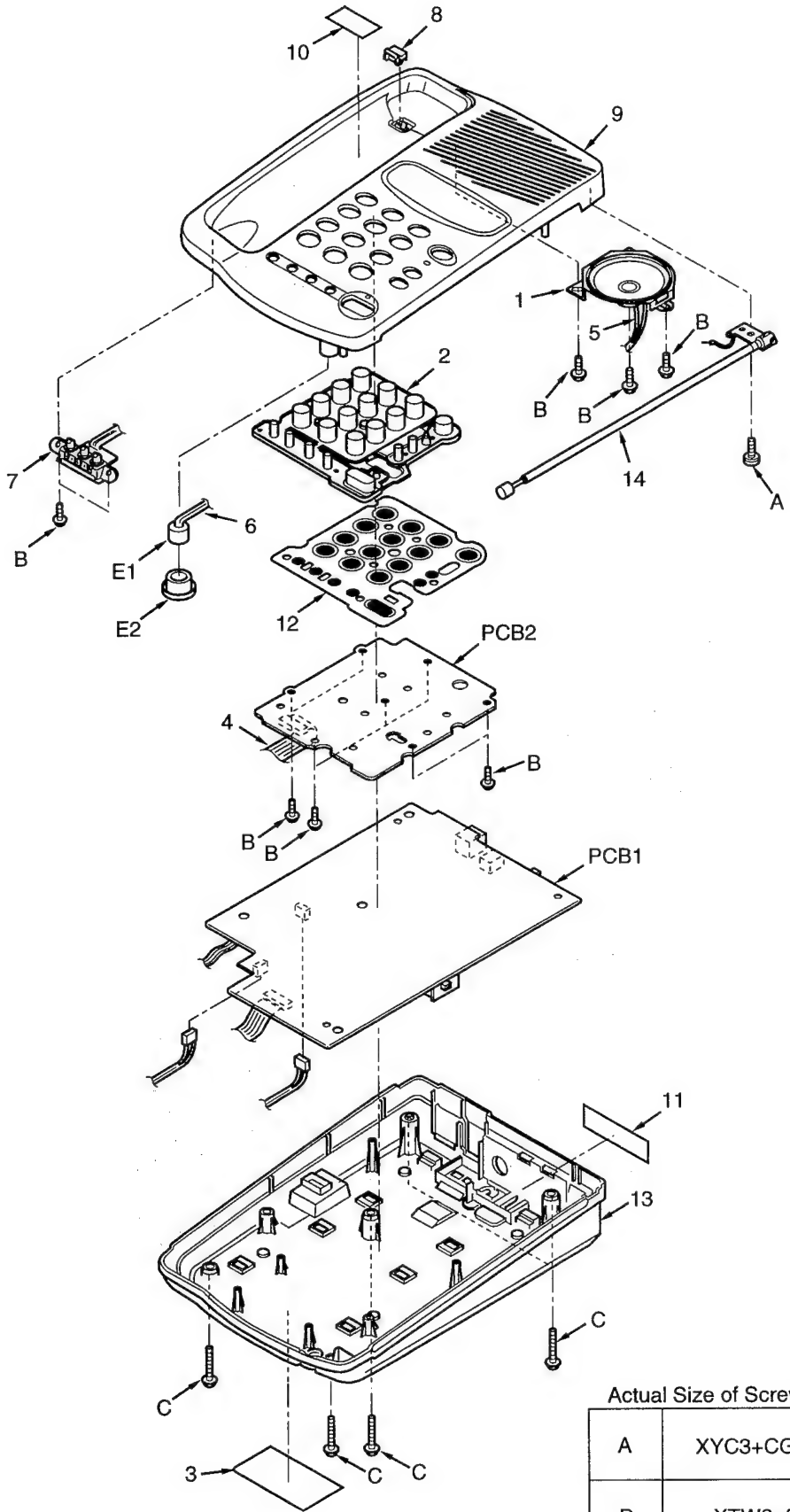


Troubleshooting Step 3: **The TALK indicator does not flash (Check the data reception).**

Check Point

Check the signal level of receiver data circuit on page 49.

CABINET AND ELECTRICAL PARTS LOCATION (BASE UNIT)

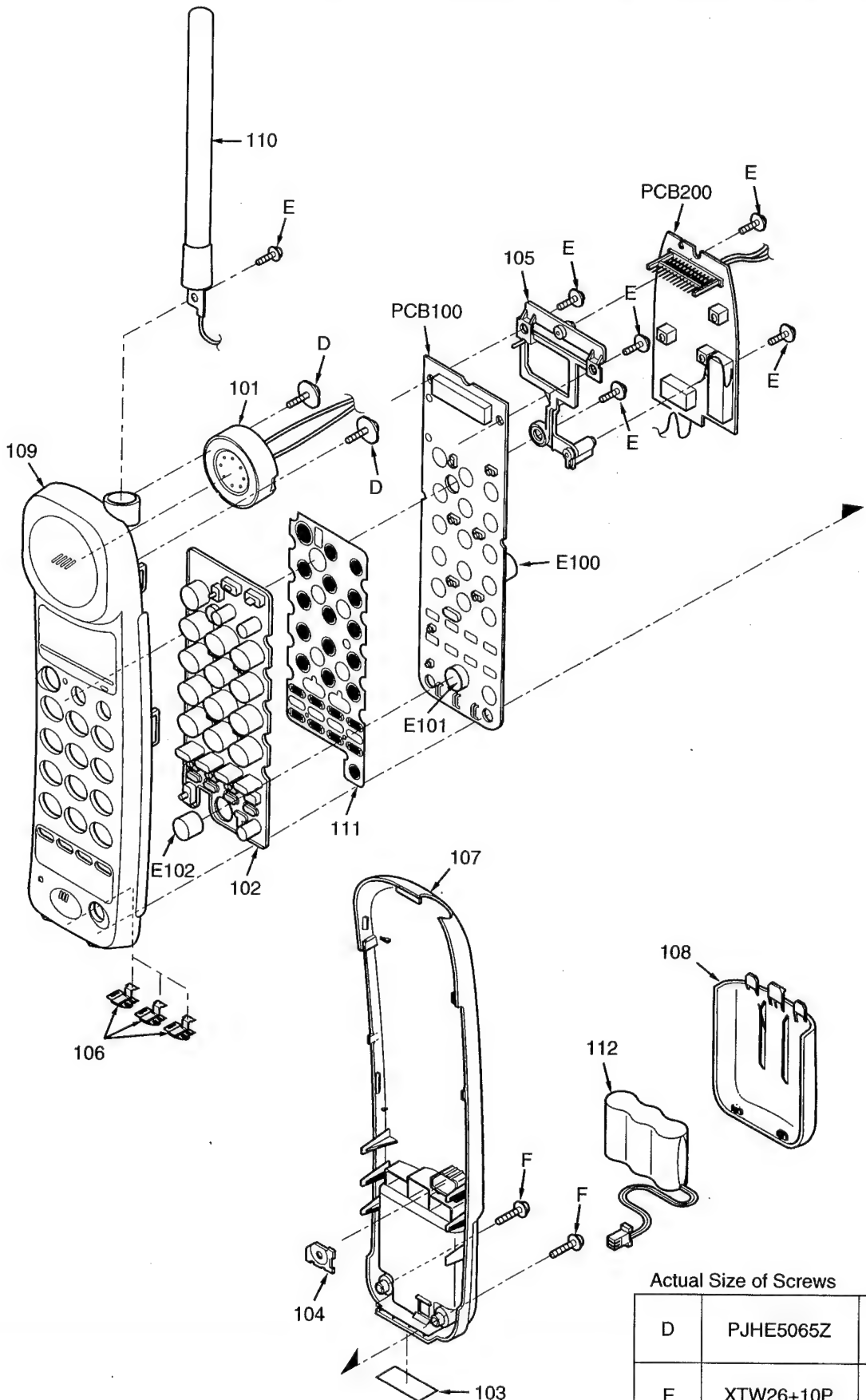


Actual Size of Screws

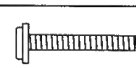
A	XYC3+CG10FX	
B	XTW3+S8M	
C	XTW3+S14P	

KX-TC187AL-W

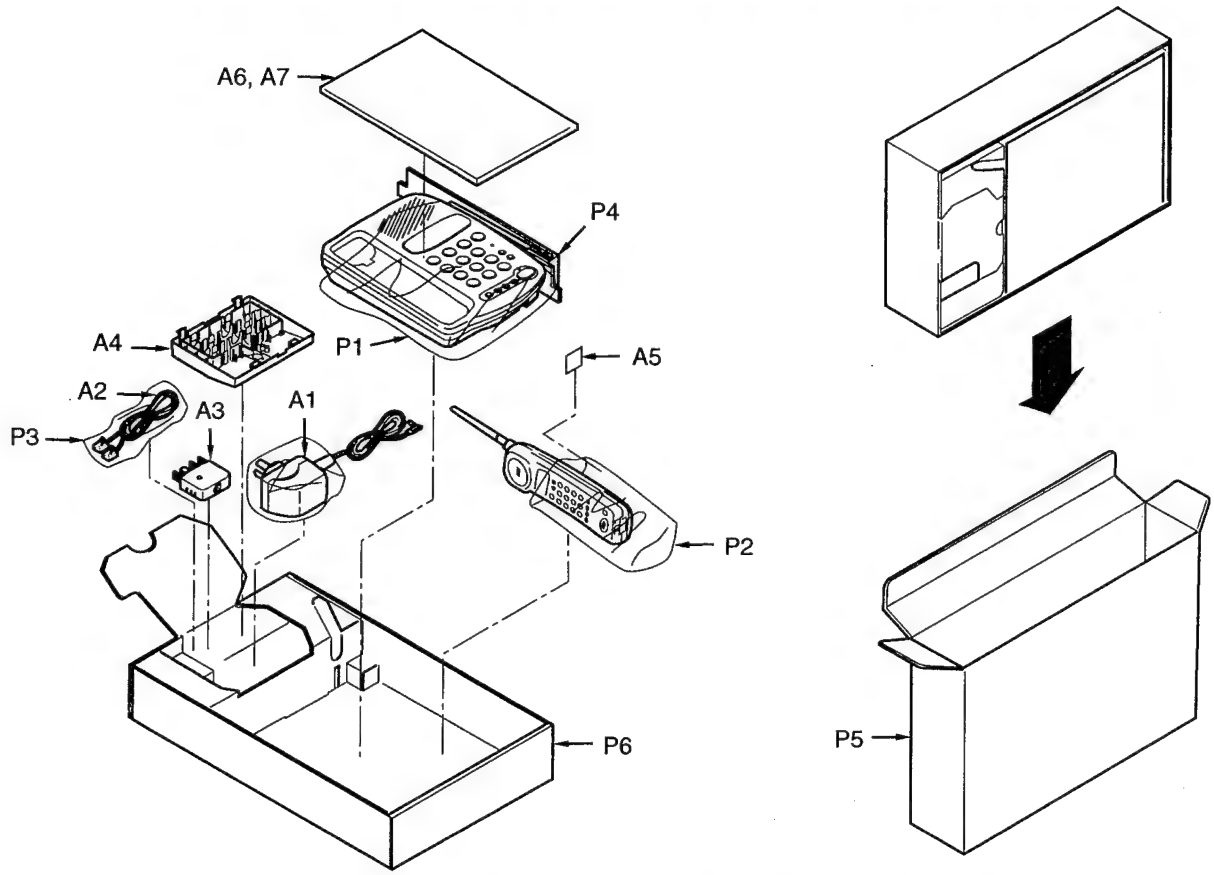
CABINET AND ELECTRICAL PARTS LOCATION (HANDSET)



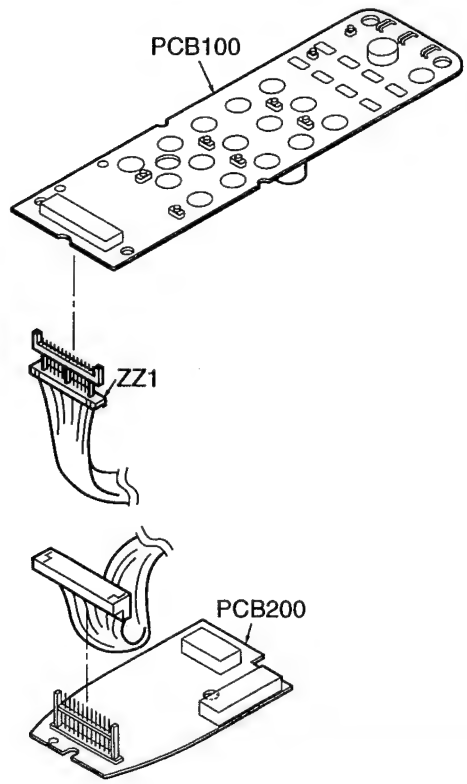
Actual Size of Screws

D	PJHE5065Z	
E	XTW26+10P	
F	XTW26+14P	

ACCESSORIES AND PACKING MATERIALS



EXTENSION CABLE CONNECTING METHOD



KX-TC187AL-W

This replacement parts list is only for the model : KX-TC187AL-W.

REPLACEMENT PARTS LIST

Base Unit

Note:

1. RTL (Retention Time Limited)
   The marking (RTL) indicates that the Retention Time is limited for this item. After the discontinuation of this assembly in production, the item will continue to be available for a specific period of time. The retention period of availability is dependent on the type of assembly, and in accordance with the laws governing part and product retention.
   After the end of this period, the assembly will no longer be available.
2. Important safety notice.
   Components identified by a ⚠ mark special characteristics important for safety. When replacing any of these components, use only manufacturer's specified parts.
3. The S mark indicates service standard parts and may differ from production parts.
4. RESISTORS & CAPACITORS
   Unless otherwise specified.
   All resistors are in ohms (Ω) K=1000Ω, M=1000KΩ
   All capacitors are in MICRO FARADS (μF) P= μμF
   *Type &Wattage of Resistor
   Type

ERC:Solid	ERX:Metal Film	PQ4R:Carbon
ERD:Carbon	ERG:Metal Oxide	ERS:Fusible Resistor
PQRD:Carbon	ER0:Metal Film	ERF:Cement Resistor

   Wattage

10,16:1/8W	14,25:1/4W	12:1/2W	1:1W	2:2W	3:3W

   *Type & Voltage of Capacitor
   Type

ECFD:Semi-Conductor	ECCD,ECKD,ECBT,PQCBC : Ceramic
ECQS:Styrol	ECQE,ECQV,ECQG : Polyester
PQCUV:Chip	ECEA,ECSZ : Electrolytic
ECQMS:Mica	ECQP : Polypropylene

   Voltage

ECQ Type	ECQG ECQV Type	ECSZ Type	Others	
1H: 50V	05: 50V	0F:3.15V	0J :6.3V	1V :35V
2A:100V	1:100V	1A:10V	1A :10V	50,1H:50V
2E:250V	2:200V	1V:35V	1C :16V	1J :63V
2H:500V		0J:6.3V	1E,25:25V	2A :100V

Ref. No.	Part No.	Part Name & Description		Pcs/Set
		CABINET & ELECTRICAL PARTS		
1	PQAS65P37Z	SPEAKER		1
2	PQBX10284W	BUTTON, 20KEY		1
3	PQGT13402Z	NAME PLATE		1
4	PQJE10087Z	LEAD WIRE		1
5	PQJS02P24Y	CONNECTOR (SP)	S	1
6	PQJS02P27X	CONNECTOR (MIC)		1
7	PQJT10136Z	CHARGE TERMINAL		1
8	PQKE10066Z1	HANGER	S	1
9	PQKM10285P3	UPPER CABINET		1
10	PQQT11664Z	WALL MOUNT LABEL		1
11	PQQT11669Z	ADAPTOR LABEL		1
12	PQSX10059Z	SHEET SWITCH		1
13	PQYF10117Q1	LOWER CABINET	S	1
14	XEAPQK170D	ANTENNA		1

Ref. No.	Part No.	Part Name & Description		Pcs/Set
		MAIN P.C.BOARD PARTS		
PCB1	PQWP1C187ALH	P.C.BOARD ASS'Y (RTL)	⚠	1
		(ICS)		
IC101	AN6183SAE1	IC	S	1
IC201	PQVIT31224AH	IC		1
IC501	MN150832KK	IC		1
IC601	PQVISC77655S	IC		1
		(TRANSISTORS)		
Q 1	2SA1625	TRANSISTOR(SI) (or 2SA1776P)		1
Q 2	2SC1740S	TRANSISTOR(SI) (or 2SC3330)		1
Q 3	PQVTKSD261CY	TRANSISTOR(SI)		1
Q101	2SD1819A	TRANSISTOR(SI)		1
Q102	2SD1819A	TRANSISTOR(SI)		1
Q103	2SD1819A	TRANSISTOR(SI)		1
Q104	2SD1819A	TRANSISTOR(SI)		1
Q105	PQVTFB1A4M	TRANSISTOR(SI)		1
Q201	2SK543	TRANSISTOR(SI)		1
Q202	2SD1819A	TRANSISTOR(SI)		1
Q301	PQVTMSC2295C	TRANSISTOR(SI)		1
Q302	2SC2412K	TRANSISTOR(SI)		1
Q303	2SB709A	TRANSISTOR(SI)	S	1
Q304	2SD1819A	TRANSISTOR(SI)		1
Q351	PQVTMSC2295C	TRANSISTOR(SI)		1
Q401	2SD2137	TRANSISTOR(SI)		1
Q402	2SD1819A	TRANSISTOR(SI)		1
Q403	2SD1994A	TRANSISTOR(SI)		1
Q404	2SD1991A	TRANSISTOR(SI)		1
Q405	2SB709A	TRANSISTOR(SI)	S	1
Q406	2SD1819A	TRANSISTOR(SI)		1
Q408	2SD1994A	TRANSISTOR(SI)		1
Q409	2SD1991A	TRANSISTOR(SI)		1
Q410	2SD1991A	TRANSISTOR(SI)		1
Q590	2SB1218A	TRANSISTOR(SI) (or 2SA1603R)		1
Q601	2SD1819A	TRANSISTOR(SI)		1
Q602	2SD1819A	TRANSISTOR(SI)		1
Q603	2SD1819A	TRANSISTOR(SI)		1
Q604	2SD1819A	TRANSISTOR(SI)		1
Q911	2SA1625	TRANSISTOR(SI) (or 2SA1776P)		1
Q941	2SD1819A	TRANSISTOR(SI)		1
Q942	2SB1218A	TRANSISTOR(SI)		1
Q943	2SD1819A	TRANSISTOR(SI)		1
		(DIODES)		
D 1	PQVDS1ZB40F1	DIODE(SI)	S	1
D 3	1SS119	DIODE(SI) (or MA165 or 1SS133)		1
D250	MA110	DIODE(SI)		1
D251	MA110	DIODE(SI)		1
D301	PQVDKV1832C3	DIODE(SI)		1

This replacement parts list is only for the model : KX-TC187AL-W.

Ref. No.	Part No.	Part Name & Description		Pcs/Set
D303	MA110	DIODE(SI)		1
				1
D401	MA4100	DIODE(SI)		
D402	MA4062	DIODE(SI)		1
D403	1SS119	DIODE(SI)		1
		(or MA165 or 1SS133)		
D404	MA110	DIODE(SI)		1
D405	1SS119	DIODE(SI)		1
		(or MA165 or 1SS133)		
D406	MA4047	DIODE(SI)		1
D407	MA700A	DIODE(SI)		1
D409	ECEA1HKS2R2	2.2		1
D450	MA4043	DIODE(SI)		1
D508	MA110	DIODE(SI)		1
D511	MA161	DIODE(SI)	S	1
D601	MA4150	DIODE(SI)		1
		DIODE(SI)	S	1
D908	1SS119	DIODE(SI)		1
		(or MA165 or 1SS133)		
D911	MA4330M	DIODE(SI)		1
		(CERAMIC FILTERS)		
CF201	PQVFSFE107MJ	CERAMIC FILTER	S	1
CF202	PQVFCFWS450F	CERAMIC FILTER		1
		(COILS AND TRANSFORMERS)		
L202	PQLQZK2R2K	COIL		1
L304	PQLQZK1R2K	COIL		1
L404	PQLQXF3R3K	COIL		1
L405	PQLQXF3R3K	COIL		1
L406	PQLQXF3R3K	COIL		1
L411	PQLQXF100K	COIL		1
L412	PQLQXF100K	COIL		1
L601	PQLQZM101K	COIL		1
L602	PQLQZM101K	COIL		1
L603	PQLQZM101K	COIL		1
L502	PQLQZM100K	COIL		1
T101	PQLT3E3A	I.F. TRANSFORMER	⚠	1
T102	PQLT3E3A	I.F. TRANSFORMER	⚠	1
T201	EQV7EL118B	COIL		1
T202	PQLI2B201	COIL		1
T203	PQLA7A13	COIL		1
T301	PQLA7A27	COIL		1
T351	PQLA7A19	COIL		1
		(CRYSTAL OSCILLATORS)		
X201	PQVCK1115N3Z	CRYSTAL OSCILLATOR		1
X501	PQVCK3573N9Z	CRYSTAL OSCILLATOR		1

Ref. No.	Part No.	Part Name & Description		Pcs/Set
		(DUPLEXES)		
DUP201	ELB6F002	COMPONENTS PARTS		1
DUP301	ELB6F001	COMPONENTS PARTS		1
		(JACKS)		
JJ1	PQJJ1B4Y	JACK, DC		1
CN4	PQJJ1TA15Z	JACK, TEL		1
		(PHOTO COUPLERS)		
PC1	PQVIPC814K	PHOTO ELECTRIC TRANSDUCER	⚠	1
PC2	PQVITLP627	PHOTO ELECTRIC TRANSDUCER	⚠	1
PC3	PQVIPC817CD	PHOTO ELECTRIC TRANSDUCER	⚠	1
PC911	PQVITLP627	PHOTO ELECTRIC TRANSDUCER	⚠	1
		(VARISTORS)		
SA1	PQVDDSS301L	VARISTOR		1
SA2	PQVDDSP302M	VARISTOR		1
		(VARIABLE RESISTORS)		
VR201	EVNDXAA03B54	VARIABLE RESISTOR	⚠	1
VR301	EVNDXAA03B15	VARIABLE RESISTOR	⚠	1
		(CONNECTORS)		
CN501	PQJS14A19Z	CONNECTOR		1
MIC	PQJP02B59Z	CONNECTOR		1
SP	PQJP02B59Z	CONNECTOR		1
		(OTHERS)		
SW501	PQSS3A17W	SWITCH, RINGER SELECTOR		1
E1	PQJM122Z	MICROPHONE		1
E2	PQMG10020Z	MIC SPACER		1
		(RESISTORS)		
R 1	ERDS2TJ223	22K		1
R 2	ERDS2TJ104	100K		1
R 3	ERDS2TJ472	4.7K		1
R 4	PQ4R10XJ683	68K	S	1
R 5	PQ4R10XJ223	22K	S	1
R 6	PQ4R10XJ682	6.8K	S	1
R 7	ERDS2TJ682	6.8K		1
R 9	ERDS2TJ331	330		1
R10	PQ4R10XJ152	1.5K	S	1
R11	PQ4R10XJ332	3.3K	S	1
R12	PQ4R10XJ103	10K	S	1
R13	ERDS2TJ220	22		1
R14	PQ4R10XJ102	1K	S	1
R16	ERDS2TJ151	150		1
R17	ERDS1TJ330	33	S	1
R18	ERDS1TJ390	39	S	1
R19	PQ4R10XJ000	0		1
R63	ERJ3GEYJ472	4.7K		1

KX-TC187AL-W

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Ref. No.	Part No.	Value		Pcs/Set
R101	ERJ3GEYJ103	10K		1
R102	ERJ3GEYJ334	330K		1
R103	ERJ3GEYJ122	1.2K		1
R104	ERJ3GEYJ221	220		1
R105	ERJ3GEYJ105	1M		1
R106	ERJ3GEYJ393	39K		1
R107	ERJ3GEYJ103	10K		1
R108	ERJ3GEYJ103	10K		1
R109	ERJ3GEYJ103	10K		1
R110	ERJ3GEYJ683	68K		1
R112	ERJ3GEYJ101	100		1
R113	PQ4R10XJ471	470	S	1
R114	ERJ3GEYJ104	100K		1
R115	ERJ3GEYJ103	10K		1
R116	ERJ3GEYJ332	3.3K		1
R117	ERJ3GEYJ684	680K		1
R118	ERJ3GEYJ820	82		1
R121	ERJ3GEYJ124	120K		1
R122	ERJ3GEYJ473	47K		1
R123	ERJ3GEYJ563	56K		1
R124	ERJ3GEYJ103	10K		1
R126	ERJ3GEYJ223	22K		1
R127	ERJ3GEY0R00	0		1
R128	ERJ3GEYJ683	68K		1
R129	ERJ3GEYJ224	220K		1
R133	ERJ3GEYJ103	10K		1
R201	ERJ3GEY0R00	0		1
R202	PQ4R10XJ331	330	S	1
R203	ERJ3GEYJ102	1K		1
R204	PQ4R10XJ220	22	S	1
R205	ERJ3GEYJ331	330		1
R206	ERJ3GEYJ183	18K		1
R207	ERJ3GEYJ822	8.2K		1
R208	ERJ3GEYJ222	2.2K		1
R209	ERJ3GEYJ154	150K		1
R210	ERJ3GEYJ154	150K		1
R211	ERJ3GEYJ562	5.6K		1
R212	ECUV1C104KBV	0.1		1
R214	ERJ3GEYJ104	100K		1
R215	ERJ3GEYJ273	27K		1
R218	ERJ3GEYJ333	33K		1
R219	ERJ3GEYJ123	12K		1
R220	ERJ3GEYJ104	100K		1
R221	ERJ3GEYJ683	68K		1
R222	ERJ3GEYJ683	68K		1
R223	ERJ3GEYJ183	18K		1
R224	ERJ3GEYJ683	68K		1
R225	PQ4R10XJ103	10K	S	1
R228	ERJ3GEYJ104	100K		1
R229	ERJ3GEY0R00	0		1
R230	ERJ3GEYJ272	2.7K		1
R231	ERJ3GEYJ183	18K		1
R232	ERJ3GEYJ223	22K		1
R233	ERJ3GEYJ334	330K		1
R234	ERJ3GEYJ104	100K		1
R235	ERJ3GEY0R00	0		1
R236	ERJ3GEYJ223	22K		1
R237	PQ4R10XJ000	0		1
R238	ERJ3GEYJ103	10K		1
R280	ERJ3GEYJ104	100K		1
R290	ERJ3GEYJ153	15K		1
R291	ERJ3GEY0R00	0		1

Ref. No.	Part No.	Value		Pcs/Set
R293	ERJ3GEYJ272	2.7K		1
R301	ERDS2TJ151	150		1
R302	PQ4R10XJ220	22	S	1
R303	ERJ3GEYJ102	1K		1
R304	ERJ3GEYJ223	22K		1
R305	ERJ3GEYJ221	220		1
R306	ERJ3GEYJ223	22K		1
R307	ERJ3GEYJ222	2.2K		1
R308	ERDS2TJ220	22		1
R309	ERJ3GEYJ103	10K		1
R311	PQ4R10XJ103	10K	S	1
R312	ERDS2TJ473	47K		1
R315	ERJ3GEYJ224	220K		1
R316	PQ4R10XJ103	10K	S	1
R317	ERJ3GEYJ103	10K		1
R351	ERDS2TJ220	22		1
R352	PQ4R10XJ562	5.6K	S	1
R353	ERDS2TJ221	220		1
R354	ERJ3GEYJ472	4.7K		1
R370	PQ4R10XJ332	3.3K	S	1
R371	PQ4R10XJ122	1.2K	S	1
R401	ERDS2TJ102	1K		1
R402	ERJ3GEYJ104	100K		1
R404	ERDS2TJ102	1K		1
R405	ERJ3GEYJ104	100K		1
R406	PQ4R10XJ104	100K	S	1
R407	ERD25TJ104	100K		1
R408	ERJ3GEYJ104	100K		1
R409	ERJ3GEYJ104	100K		1
R410	PQ4R10XJ472	4.7K	S	1
R411	PQ4R10XJ824	820K	S	1
R412	PQ4R10XJ103	10K	S	1
R414	ERJ3GEYJ473	47K		1
R415	ERDS2TJ391	390		1
R416	ERDS2TJ181	180		1
R417	ERDS2TJ103	10K		1
R418	ERDS2TJ390	39		1
R419	ERDS2TJ103	10K		1
R420	ERDS2TJ472	4.7K		1
R421	PQ4R10XJ103	10K	S	1
R423	ERDS2TJ470	47		1
R501	ERJ3GEYJ104	100K		1
R502	ERJ3GEYJ682	6.8K		1
R503	ERJ3GEYJ682	6.8K		1
R504	ERJ3GEYJ473	47K		1
R505	ERJ3GEYJ104	100K		1
R506	ERJ3GEYJ124	120K		1
R507	ERJ3GEYJ563	56K		1
R508	ERJ3GEYJ273	27K		1
R509	ERJ3GEYJ153	15K		1
R510	ERJ3GEYJ104	100K		1
R511	ERJ3GEYJ102	1K		1
R512	ERJ3GEYJ182	1.8K		1
R513	ERJ3GEYJ152	1.5K		1
R514	ERJ3GEYJ333	33K		1
R515	ERJ3GEY0R00	0		1
R516	ERJ3GEYJ472	4.7K		1
R517	ERJ3GEYJ472	4.7K		1
R519	ERJ3GEYJ103	10K		1
R520	ERJ3GEYJ681	680		1
R522	ERDS2TJ334	330K		1
R526	ERJ3GEYJ274	270K		1

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Ref. No.	Part No.	Value		Pcs/Set
R530	ERDS2TJ103	10K		1
R531	ERJ3GEYJ473	47K		1
R532	ERJ3GEYJ104	100K		1
R533	ERDS2TJ104	100K		1
R534	PQ4R10XJ333	33K	S	1
R536	ERJ3GEYJ332	3.3K		1
R539	ERJ3GEY0R00	0		1
R591	ERJ3GEYJ332	3.3K		1
R592	ERJ3GEYJ121	120		1
R593	ERJ3GEYJ332	3.3K		1
R601	ERJ3GEYJ821	820		1
R602	ERJ3GEYJ472	4.7K		1
R603	ERJ3GEYJ562	5.6K		1
R604	PQ4R10XJ222	2.2K	S	1
R605	ERJ3GEYJ303	30K		1
R606	ERJ3GEYJ683	68K		1
R607	ERJ3GEYJ225	2.2M		1
R608	ERJ3GEYJ275	2.7M		1
R609	ERJ3GEYJ104	100K		1
R610	ERJ3GEYJ472	4.7K		1
R611	ERJ3GEYJ103	10K		1
R612	PQ4R18XJ332	3.3K	S	1
R613	PQ4R10XJ472	4.7K	S	1
R614	ERJ3GEYJ472	4.7K		1
R615	ERJ3GEYJ183	18K		1
R616	ERJ3GEYJ104	100K		1
R617	ERJ3GEYJ333	33K		1
R618	ERJ3GEYJ223	22K		1
R619	ERJ3GEYJ222	2.2K		1
R620	ERJ3GEYJ101	100		1
R621	ERJ3GEYJ104	100K		1
R622	ERJ3GEYJ684	680K		1
R623	ERJ3GEYJ562	5.6K		1
R624	ERJ3GEYJ682	6.8K		1
R625	ERJ3GEYJ103	10K		1
R626	ERJ3GEYJ184	180K		1
R628	ERJ3GEYJ104	100K		1
R629	ERJ3GEYJ222	2.2K		1
R630	ERJ3GEYJ104	100K		1
R631	ERJ3GEYJ225	2.2M		1
R632	ERJ3GEYJ102	1K		1
R634	ERJ3GEY0R00	0		1
R710	ERJ3GEYJ105	1M		1
R720	ERJ3GEYJ564	560K		1
R750	ERJ3GEYJ123	12K		1
R800	ERJ3GEYJ472	4.7K		1
R911	ERDS2TJ104	100K		1
R912	ERDS2TJ472	4.7K		1
R913	ERDS1TJ101	100	S	1
R914	ERJ3GEYJ472	4.7K		1
R941	ERJ3GEYJ334	330K		1
R942	ERJ3GEYJ122	1.2K		1
R943	ERJ3GEYJ561	560		1
R944	ERJ3GEYJ562	5.6K		1
R945	ERJ3GEYJ104	100K		1
R946	ERJ3GEYJ822	8.2K		1
R947	ERJ3GEYJ682	6.8K		1
R949	ERJ3GEYJ105	1M		1
R967	PQCBC1C682KX	0.0068	S	1

Ref. No.	Part No.	Value		Pcs/Set
R1000	ERJ3GEY0R00	0		1
J301	ERJ3GEYJ223	22K		1
J302	ERJ3GEYJ104	100K		1
J306	PQ4R10XJ000	0		1
J307	PQ4R10XJ000	0		1
J308	PQ4R10XJ000	0		1
J309	PQ4R10XJ000	0		1
J311	PQ4R18XJ000	0	S	1
J312	PQ4R18XJ000	0	S	1
J313	PQ4R18XJ000	0	S	1
J314	PQ4R18XJ000	0	S	1
J315	PQ4R18XJ000	0	S	1
J316	PQ4R18XJ000	0	S	1
J317	PQ4R18XJ000	0	S	1
J318	PQ4R18XJ000	0	S	1
J320	ERJ3GEY0R00	0		1
J321	ERJ3GEY0R00	0		1
J322	ERJ3GEY0R00	0		1
J323	ERJ3GEY0R00	0		1
J324	ERJ3GEY0R00	0		1
J325	ERJ3GEY0R00	0		1
J700	PQ4R10XJ000	0		1
		(CAPACITORS)		
C 1	ECQE2E224JZ	0.22	S	1
C 4	ECKD2H681KB	680P	S	1
C 5	ECKD2H681KB	680P	S	1
C 6	ECEA1EU101	100	S	1
C 7	ECUV1H103KB	0.01		1
C 8	ECEA1CKS100	10	S	1
C10	PQCUV1E104MD	0.1	S	1
C11	ECEA1HU470	47		1
C12	PQCUV1H102J	0.001	S	1
C13	PQCUV1H103KB	0.01		1
C14	PQCUV1E223KB	0.022		1
C15	ECEA1CKS100	10		1
C16	ECEA1HU3R3	3.3		1
C17	ECEA1CKS220	22	S	1
C18	ECEA1HU2R2	2.2		1
C20	ECKDNB471MB	470P	⚠	1
C101	PQCUV1H102J	0.001	S	1
C103	ECUV1H121JCV	120P		1
C105	ECUV1C104KBV	0.1		1
C106	ERJ3GEY0R00	0		1
C107	ECUV1C104KBV	0.1		1
C109	ERJ3GEY0R00	0		1
C110	ECEA1CKS100	10	S	1
C111	ECUV1C104KBV	0.1		1

KX-TC187AL-W

This replacement parts list is only for the model : KX-TC187AL-W.

Ref. No.	Part No.	Value		Pcs/Set
C112	ECUV1H101JCV	100P		1
C113	ECUV1C104KBV	0.1		1
C115	PQCUV1E104MD	0.1	S	1
C116	PQCUV1C105ZF	1		1
C117	PQCUV1E104MD	0.1	S	1
C201	PQ4R10XJ000	0		1
C203	ECUV1C104ZFV	0.1		1
C204	ECUV1H103KBV	0.01		1
C205	ECUV1H103KBV	0.01		1
C206	PQCUV1H102J	0.001	S	1
C207	ECEA1CKS100	10	S	1
C208	ECUV1C104ZFV	0.1		1
C209	ECEA1HKSR47	0.47	S	1
C210	ECUV1H102KBV	0.001		1
C211	ECUV1C104ZFV	0.1		1
C212	PQCUV1E104MD	0.1	S	1
C213	ECUV1C104KBV	0.1		1
C214	ECUV1H270JCV	27P		1
C215	ECUV1C104ZFV	0.1		1
C216	ECEA1AU470	47		1
C217	ECUV1H472KBV	0.0047		1
C218	ECUV1H221JCV	220P		1
C219	ECUV1H221JCV	220P		1
C220	ECUV1C683KBV	0.068		1
C221	PQCUV1E473MD	0.047	S	1
C222	ECUV1H103KBV	0.01		1
C223	ECUV1H222KBV	0.0022		1
C226	ECUV1H331JCV	330P	S	1
C227	ECUV1C104KBV	0.1		1
C228	ECUV1H472KBV	0.0047		1
C229	ECUV1H152KBV	0.0015		1
C230	ECEA1HKS010	1		1
C231	ECUV1C104KBV	0.1		1
C232	ECUV1H682KBV	0.0068		1
C233	ECUV1H271JCV	270P		1
C234	ECUV1H122KBV	0.0012		1
C237	ECUV1H560GCV	56P		1
C238	ECUV1H470GCV	47P		1
C239	ECUV1H560GCV	56P		1
C241	PQCUV1E104MD	0.1	S	1
C242	ECUV1H334ZF	0.33	S	1
C243	ECEA1HKS2R2	2.2	S	1
C245	ECEA1HKSR47	0.47	S	1
C246	ECUV1H223KBV	0.022	S	1
C247	PQCUV1E104MD	0.1	S	1
C248	ECUV1H100DCV	10P		1
C249	ECUV1H102KBV	0.001		1
C250	ECUV1H103KBV	0.01	S	1
C251	PQCUV1E104MD	0.1	S	1
C254	ECUV1H103KBV	0.01		1
C255	ECUV1C104KBV	0.1		1
C261	ECUV1H223KBV	0.022	S	1
C263	ECUV1H272KBV	0.0027		1
C264	ECUV1A105ZFV	1		1
C266	ECUV1C104KBV	0.1		1
C281	ECUV1C104ZFV	0.1		1
C291	ECUV1H101JCV	100P		1
C301	PQCUV1H103ZF	0.01		1
C302	ECUV1H103KBV	0.01	S	1
C303	PQCUV1H470JC	47P		1
C304	ECUV1H220JCV	22P		1

Ref. No.	Part No.	Value		Pcs/Set
C305	ECUV1H103KBV	0.01	S	1
C306	ECUV1H470JCV	47P		1
C307	ECUV1H560JCV	56P		1
C308	ECUV1H220JCV	22P		1
C309	ECUV1H120JUV	12P		1
C310	ECUV1H150JCV	15P		1
C311	ECUV1H103KBV	0.01		1
C313	PQCUV1C105ZF	1		1
C314	ECUV1H220JCV	22P		1
C316	PQ4R10XJ000	0		1
C317	ECUV1C104ZFV	0.1		1
C319	PQCUV1E104MD	0.1	S	1
C351	PQCUV1H103ZF	0.01		1
C352	ECUV1H220JCV	22P		1
C353	ECUV1H470JCV	47P		1
C354	PQCUV1H103ZF	0.01		1
C358	ECUV1H020CCV	2P		1
C365	ECUV1C104KBV	0.1		1
C401	ECUV1E105ZF	1		1
C402	PQCUV1E104MD	0.1	S	1
C403	ECA1CM471	470P		1
C404	ECEA1CU331	330		1
C406	ECEA1AU101	100		1
C407	PQCUV1C224ZF	0.22	S	1
C408	ECEA0JU102	1000		1
C409	PQCUV1E104MD	0.1	S	1
C410	PQCUV1H103KB	0.01		1
C411	PQCUV1E104MD	0.1	S	1
C412	ECEA0JU331	330		1
C413	PQCUV1E104MD	0.1	S	1
C501	ECUV1H152KBV	0.0015		1
C502	ECUV1H561JCV	560P	S	1
C503	ECUV1C104ZFV	0.1		1
C504	ECUV1C104ZFV	0.1		1
C505	ECUV1C104ZFV	0.1		1
C507	ECUV1H220JCV	22P		1
C508	ECUV1H220JCV	22P		1
C510	ECEA0JWA102	1000		1
C511	ECUV1C104ZFV	0.1		1
C512	ECUV1H222KBV	0.0022		1
C514	ECUV1H103KB	0.01		1
C515	ECUV1C104ZFV	0.1		1
C519	ECUV1C104ZFV	0.1		1
C551	ECUV1H103KBV	0.01	S	1
C601	PQCUV1H103ZF	0.01		1
C602	ECUV1C683KBV	0.068		1
C603	ECUV1C683KBV	0.068		1
C604	PQCUV1E104MD	0.1	S	1
C605	PQCUV1E104MD	0.1	S	1
C606	PQCUV1E104MD	0.1	S	1
C607	ECUV1H333KDV	0.033	S	1
C608	ECEA1HKS010	1		1
C609	ECEA1HKS010	1		1
C610	ECEA1EK470	47	S	1
C611	ECEA1VKS4R7	4.7	S	1
C612	ECEA1VU330	33	S	1
C613	PQCUV1C105ZF	1		1
C614	PQCUV1C105ZF	1		1
C615	PQCUV1C105ZF	1		1
C616	ECEA1CKS100	10		1
C617	ECEA1AU102	1000		1

This replacement parts list is only for the model : KX-TC187AL-W.

Ref. No.	Part No.	Value		Pcs/Set
C618	ECUV1H103KBV	0.01		1
C619	ECEA1VKS4R7	4.7	S	1
C620	ECEA1EK470	47	S	1
C621	ECEA1AKA221	220		1
C623	ECUV1E183KBV	0.018		1
C624	ECUV1H151JCV	150P		1
C625	ECUV1C473KBV	0.047		1
C626	ECUV1H103KBV	0.01		1
C627	ECUV1H152KBV	0.0015		1
C629	ECUV1H471JCV	470P	S	1
C631	ECUV1H101JCV	100P		1
C632	ECUV1C104KBV	0.1		1
C633	ECUV1C104KBV	0.1		1
C634	PQCUV1E104MD	0.1	S	1
C710	ECUV1H103KBV	0.01		1
C750	ECUV1H562KBV	0.0056		1
C776	ECUV1C104ZFV	0.1		1
C941	ECUV1C104KBV	0.1		1
C942	ECUV1H101JCV	100P		1
C944	ECUV1C104KBV	0.1		1
C945	ECEA1VU330	33	S	1
C946	ECUV1C104KBV	0.1		1
OPERATIONAL P.C.BOARD PARTS				
PCB2	PQWP2TC185BH	P.C.BOARD ASS'Y (RTL)		1
		(DIODES)		
LED702	PQVDPY1112H	DIODE(SI)		1
LED703	PQVDBR1112H	DIODE(SI)		1
		(CONNECTORS)		
CN502	PQJS14A19Z	CONNECTOR		1

KX-TC187AL-W

This replacement parts list is only for the model : KX-TC187AL-W.

REPLACEMENT PARTS LIST

Handset

Note:

1. RTL (Retention Time Limited)
   The marking (RTL) indicates that the Retention Time is limited for this item. After the discontinuation of this assembly in production, the item will continue to be available for a specific period of time. The retention period of availability is dependent on the type of assembly, and in accordance with the laws governing part and product retention.
   After the end of this period, the assembly will no longer be available.
2. Important safety notice.
   Components identified by a ⚠ mark special characteristics important for safety. When replacing any of these components, use only manufacturer's specified parts.
3. The S mark indicates service standard parts and may differ from production parts.
4. RESISTORS & CAPACITORS
   Unless otherwise specified.
   All resistors are in ohms (Ω) K=1000Ω, M=1000KΩ
   All capacitors are in MICRO FARADS (μF) P= μμF
   *Type &Wattage of Resistor
   Type

ERC:Solid	ERX:Metal Film	PQ4R:Carbon
ERD:Carbon	ERG:Metal Oxide	ERS:Fusible Resistor
PQRD:Carbon	ER0:Metal Film	ERF:Cement Resistor

Wattage

10,16:1/8W	14,25:1/4W	12:1/2W	1:1W	2:2W	3:3W

*Type & Voltage of Capacitor
Type

ECFD:Semi-Conductor	ECCD,ECKD,ECBT,PQCBC : Ceramic
ECQS:Styrol	ECQE,ECQV,ECQG : Polyester
PQCUV:Chip	ECEA,ECSZ : Electrolytic
ECQMS:Mica	ECQP : Polypropylene

Voltage

ECQ Type	ECQG ECQV Type	ECSZ Type	Others	
1H: 50V	05: 50V	0F:3.15V	0J :6.3V	1V :35V
2A:100V	1:100V	1A:10V	1A :10V	50,1H:50V
2E:250V	2:200V	1V:35V	1C :16V	1J :63V
2H:500V		0J:6.3V	1E,25:25V	2A :100V

Ref. No.	Part No.	Part Name & Description		Pcs/Set
		CABINET & ELECTRICAL PARTS		
101	PQAX3P16Z	SPEAKER		1
102	PQBX10288M	BUTTON, KEY		1
103	PQGT13401Z	NAME PLATE		1
104	PQHG10479Z	SPACER		1
105	PQHR10559Y	RF HOLDER		1
106	PQJT10137Z	CHARGE TERMINAL		3
107	PQKF10212X1	REAR CABINET	S	1
108	PQKK10081Z1	BATTERY COVER	S	1
109	PQKM10289C5	UPPER CABINET		1
110	PQSA10054Y	ANTENNA		1
111	PQSX10057Z	SHEET SWITCH		1
112	PQXA36ASVC	BATTERY	S	1

Ref. No.	Part No.	Part Name & Description		Pcs/Set
		MAIN P.C.BOARD PARTS		
PCB100	PQWP1C187ALR	P.C.BOARD ASS'Y (RTL)		1
		(ICS)		
IC201	XN1116	TRANSISTOR(SI)		1
IC202	PQVI0008GE98	IC		1
IC203	PQVIS80730AL	IC	S	1
IC204	PQVIXCC3501P	IC		1
		(TRANSISTORS)		
Q201	2SD601R	TRANSISTOR(SI)	S	1
Q202	2SD601R	TRANSISTOR(SI)	S	1
Q203	2SB709A	TRANSISTOR(SI)	S	1
Q204	PQVTD123T146	TRANSISTOR(SI)	S	1
Q205	PQVTD123T146	TRANSISTOR(SI)	S	1
Q206	PQVT143XK146	TRANSISTOR(SI)	S	1
		(DIODES)		
D201	MA110	DIODE(SI)		1
D202	PQCUV1C105ZF	CERAMIC CAPACITOR		1
D203	MA728	DIODE(SI)		1
D204	PQVDS5688G	DIODE(SI)		1
		(LEDS)		
LED201	LNJ301MPUJA	DIODE(SI)		1
LED202	LNJ301MPUJA	DIODE(SI)		1
LED203	LNJ301MPUJA	DIODE(SI)		1
LED204	LNJ301MPUJA	DIODE(SI)		1
LED205	LNJ301MPUJA	DIODE(SI)		1
LED206	LNJ301MPUJA	DIODE(SI)		1
LED207	PQVDSLN210VC	DIODE(SI)		1
		(COILS)		
L201	PQLQZMR68M	COIL	S	1
L202	PQLQZM100K	COIL		1
L203	PQLQZM220K	COIL		1
L204	PQLQZM1R0K	COIL		1
L205	PQLQR1MR68M	COIL		1
		(CONNECTORS)		
CN101	PQJP2D13Z	CONNECTOR		1
CN201	PQJS12A36Z	CONNECTOR		1
		(CRYSTALS)		
X201	PQVCJ3992N9Z	CRYSTAL OSCILLATOR		1
X202	PQVCL3276N9Z	CRYSTAL OSCILLATOR		1
		(OTHERS)		
E100	PQEFBDB111GP	BUZZER		1
E101	PQJM122Z	MICROPHONE		1
E102	PQHE10070Z	MIC SPONGE		1

This replacement parts list is only for the model : KX-TC187AL-W.

Ref. No.	Part No.	Value		Pcs/Set
		(RESISTORS)		
R27	PQ4R10XJ183	18K	S	1
R201	PQ4R10XJ104	100K	S	1
R202	PQ4R10XJ334	330K	S	1
R203	PQ4R10XJ334	330K	S	1
R204	PQ4R10XJ331	330	S	1
R205	PQ4R10XJ103	10K	S	1
R206	PQ4R10XJ472	4.7K	S	1
R208	PQ4R10XJ104	100K	S	1
R209	PQ4R10XJ331	330	S	1
R211	PQ4R10XJ472	4.7K	S	1
R212	PQ4R10XJ472	4.7K	S	1
R213	PQ4R10XJ473	47K	S	1
R215	PQ4R10XJ104	100K	S	1
R217	PQ4R10XJ333	33K	S	1
R219	PQ4R10XJ104	100K	S	1
R220	PQ4R10XJ473	47K	S	1
R221	PQ4R10XJ122	1.2K	S	1
R222	PQ4R10XJ222	2.2K	S	1
R223	PQ4R10XJ103	10K	S	1
R224	PQ4R10XJ332	3.3K	S	1
R225	PQ4R10XJ104	100K	S	1
R226	PQ4R10XJ104	100K	S	1
R228	PQ4R10XJ681	680	S	1
R229	PQ4R18XJ681	680	S	1
R230	PQ4R10XJ681	680	S	1
R232	PQ4R10XJ221	220	S	1
R234	PQ4R10XJ332	3.3K	S	1
R238	PQ4R10XJ103	10K	S	1
R240	PQ4R10XJ120	12	S	1
R241	PQ4R18XJ102	1K	S	1
R243	PQ4R10XJ104	100K	S	1
R245	PQ4R10XJ331	330	S	1
R246	PQ4R10XJ331	330	S	1
R251	PQ4R10XJ270	27	S	1
R252	PQ4R10XJ124	120K	S	1
J207	PQ4R10XJ000	0		1
		(CAPACITORS)		
C203	ECEA0GKS221	220		1
C205	PQCUV1C105ZF	1		1
C208	PQCUV1H103ZF	0.01		1
C209	PQCUV1C105ZF	1		1
C210	PQCUV1C105ZF	1		1
C211	PQCUV1H103ZF	0.01		1
C212	PQCUV1E104MD	0.1	S	1
C214	PQCUV1H470JC	47P		1
C215	PQCUV1H470JC	47P		1
C216	PQCUV1H270JC	27P		1
C217	PQCUV1H270JC	27P		1
C218	PQCUV1H103ZF	0.01		1
C219	PQCUV1H103ZF	0.01		1
C220	PQCUV1E104MD	0.1	S	1
C221	PQCUV1H102J	0.001	S	1
C222	PQCUV1C105ZF	1		1
C223	PQCUV1E104MD	0.1	S	1
C225	PQCUV1H821JC	820P	S	1

Ref. No.	Part No.	Part Name, Description, & Value		Pcs/Set
		RF P.C.BOARD PARTS		
PCB200	PQWP2C187ALR	P.C.BOARD ASS'Y (RTL)		1
		(IC)		
IC1	PQVIT31224AR	IC		1
		(TRANSISTORS)		
Q101	PQVTMSC2295C	TRANSISTOR(SI)		1
Q102	PQVTMSC2295C	TRANSISTOR(SI)		1
Q103	PQVTMSC2295C	TRANSISTOR(SI)		1
		(DIODES)		
D101	MA840BTAKU	DIODE(SI)		1
D102	MA840ATAKU	DIODE(SI)		1
		(CERAMIC FILTERS)		
CF1	PQVFSFE107MJ	CERAMIC FILTER	S	1
CF2	PQVFCFH455F1	CERAMIC FILTER		1
		(COILS)		
L 1	PQLQZM1R8K	COIL		1
L 4	PQLI2B201	COIL		1
L 5	PQLA7A27	COIL		1
L103	PQLA7A19	COIL		1
L105	PQLA7A25	COIL		1
		(CRYSTAL OSCILLATOR)		
X1	PQVCK1024LC5	CRYSTAL OSCILLATOR		1
		(DUPLEXS)		
DUP1	PQVFR27RX	CERAMIC FILTER		1
DUP101	PQVFR27TX	CERAMIC FILTER		1
		(VARIABLE RESISTORS)		
VR1	EVNDXAA03B34	VARIABLE RESISTOR		1
VR101	EVNDXAA03B35	VARIABLE RESISTOR	S	1
		(OTHERS)		
CN1	PQJP12B55Z	CONNECTOR		1
		(RESISTORS)		
R 1	ERJ3GEYJ220	22		1
R 2	ERJ3GEYJ331	330		1
R 3	ERJ3GEYJ183	18K		1
R 4	ERJ3GEYJ682	6.8K		1
R 5	ERJ3GEYJ154	150K		1
R 6	ERJ3GEYJ561	560		1
R 7	ERJ3GEYJ154	150K		1
R 8	ERJ3GEYJ562	5.6K		1
R 9	ERJ3GEYJ153	15K		1

KX-TC187AL-W

This replacement parts list is only for the model : KX-TC187AL-W.

Ref. No.	Part No.	Value		Pcs/Set
R10	ERJ3GEYJ561	560		1
R11	ERJ3GEYJ822	8.2K		1
R12	ERJ3GEYJ223	22K		1
R13	ERJ3GEY0R00	0		1
R14	ERJ3GEYJ822	8.2K		1
R15	ERJ3GEY0R00	0		1
R16	ERJ3GEYJ223	22K		1
R18	ERJ3GEYJ103	10K		1
R19	ERJ3GEYJ124	120K		1
R20	ERJ3GEYJ184	180K		1
R23	ERJ3GEYJ153	15K		1
R24	ERJ3GEYJ223	22K		1
R30	ERJ3GEYJ393	39K		1
R31	ERJ3GEYJ393	39K		1
R32	ERJ3GEYJ393	39K		1
R33	ERJ3GEYJ393	39K		1
R34	ERJ3GEYJ474	470K		1
R35	ERJ3GEYJ123	12K		1
R36	ERJ3GEYJ104	100K		1
R37	ERJ3GEYJ562	5.6K		1
R38	ERJ3GEYJ222	2.2K		1
R39	ERJ3GEYJ222	2.2K		1
R101	ERJ3GEYJ561	560		1
R102	ERJ3GEYJ220	22		1
R103	ERJ3GEYJ223	22K		1
R104	ERJ3GEYJ273	27K		1
R105	ERJ3GEYJ101	100		1
R106	ERJ3GEYJ220	22		1
R108	ERJ3GEYJ472	4.7K		1
R109	ERJ3GEYJ822	8.2K		1
R110	ERJ3GEYJ393	39K		1
R111	ECUV1H3R0BCV	3		1
R112	ERJ3GEYJ820	82		1
R113	ERJ3GEYJ683	68K		1
R115	ECUV1C104KBV	0.1		1
R116	ERJ3GEYJ683	68K		1
R117	ERJ3GEYJ154	150K		1
R500	ERJ3GEYJ2R2	2.2		1
R501	ERJ3GEYJ183	18K		1
R502	ERJ3GEYJ103	10K		1
		(CAPACITORS)		
C 1	ERJ3GEY0R00	0		1
C 2	ECUV1H103KBV	0.01	S	1
C 3	ECST1EY474	0.47		1
C 4	ECUV1H102KBV	0.001		1
C 5	PQCUV1E104MD	0.1	S	1
C 6	ECEA0JKS470	47		1
C 7	ECUV1C104ZFV	0.1		1
C 8	ECUV1H270JCV	27P	S	1
C 9	ECUV1H221JCV	220P		1

Ref. No.	Part No.	Value		Pcs/Set
C10	ECUV1H472KBV	0.0047		1
C11	ECUV1H221JCV	220P		1
C12	PQCUV1C683KB	0.068		1
C13	PQCUV1C105ZF	1		1
C14	ECEA1CKS100	10		1
C15	PQCUV1C473KB	0.047		1
C16	ECUV1H102KBV	0.001		1
C17	PQCUV1C105ZF	1		1
C18	ECUV1H103KBV	0.01		1
C19	ECUV1C104KBV	0.1		1
C20	ECUV1H472KBV	0.0047		1
C21	ECUV1H470JUV	47P		1
C22	ECUV1C104KBV	0.1		1
C23	ECUV1H102KBV	0.001		1
C24	ECEA1CKS220	22		1
C25	ECSTAJ1CA225	2.2	S	1
C26	PQCUV1C224KB	0.22		1
C27	ECUV1H102KBV	0.001		1
C28	ECUV1H681JCV	680P	S	1
C29	ECUV1C473KBV	0.047		1
C30	ECUV1H103KBV	0.01		1
C32	ECUV1C104KBV	0.1		1
C34	ECUV1H510GCV	51P		1
C35	ECUV1H560GCV	56P		1
C36	ECUV1H560GCV	56P		1
C37	ECUV1H221JCV	220P		1
C38	ECUV1H681JCV	680P	S	1
C39	ECUV1H223KBV	0.022	S	1
C40	ECUV1H562KBV	0.0056		1
C41	ECEA1HKS010	1		1
C42	ECUV1H151JCV	150P		1
C43	ECUV1H223KBV	0.022	S	1
C45	ECUV1H102KBV	0.001		1
C46	ECUV1H102KBV	0.001		1
C47	ECUV1H102KBV	0.001		1
C48	ECUV1C104KBV	0.1		1
C49	ECUV1H103KBV	0.01		1
C50	ECUV1C104KBV	0.1		1
C51	ECUV1H103KBV	0.01		1
C52	ECUV1C104KBV	0.1		1
C53	ECUV1H820JCV	82P		1
C102	ERJ3GEY0R00	0		1
C104	ECUV1H220JCV	22P		1
C105	ECUV1H103KBV	0.01	S	1
C106	ECUV1H680JCV	68P		1
C107	ECUV1H680JCV	68P		1
C108	ECUV1H020CCV	2P		1
C109	ERJ3GEYJ332	3.3K		1
C110	ECUV1H103KBV	0.01		1
C111	ECUV1H220JCV	22P		1
C113	ECUV1H150JRV	15P		1
C114	ECUV1H103KBV	0.01		1
C115	ECUV1H103KBV	0.01	S	1
C116	ECUV1C104ZFV	0.1		1
C117	ECUV1H220JCV	22P	S	1
C118	ECUV1H3R0BCV	3		1
C120	ECUV1C104KBV	0.1		1
C500	ECUV1H103KBV	0.01	S	1
C501	ECUV1H103KBV	0.01	S	1
C502	ECUV1H680JCV	68P		1
C503	ECUV1H103KBV	0.01	S	1
C505	ECUV1H270JCV	27P		1

This replacement parts list is only for the model : KX-TC187AL-W.

KX-TC187AL-W			
Ref. No.	Part No.	Part Name & Description	Pcs/Set
		ACCESSORIES	
A1	KX-A11BAXAL	AC ADAPTOR ⚠	1
A2	PQJA10059Z	TEL CORD (for Australia)	1
A2	PQJA87S	TEL CORD (for New Zealand)	1
A3	PQJS04S11Z	TEL PLUG (for Australia)	1
A4	PQKL10028Z1	STAND S	1
A5	PQQT11564Z	TEL CARD LABEL	2
A6	PQQW12037Z	QUICK REFERENCE GUIDE	1
A7	PQQX12090Z	INSTRUCTION BOOK (for Australia)	1
A7	PQQX12090Y	INSTRUCTION BOOK (for New Zealand)	1
		PACKING MATERIALS	
P1	PQPH89Y	PROTECTION COVER (for Base Unit)	1
P2	XZB11X40A02	PROTECTION COVER (for Handset)	1
P3	XZB15X25A01	PROTECTION COVER (for Tel Cord) (for Australia)	1
P4	PQPD10405Z	CUSHION	1
P5	PQPK12672Z	GIFT BOX (for Australia)	1
P5	PQPK12672Y	GIFT BOX (for New Zealand)	1
P6	PQPN10645Z	CUSHION	1
		TOOL	
ZZ1	PQZZ12K11Z	EXTENSION CORD, 12P	1
Note: PQZZ12K11Z is useful for servicing (It make servicing easy).			

H (Q)
KXTC187ALW-L4
KXTC187ALW-LZ
Printed in Japan